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NATIONAL DAM SAFETY PROGRAM. ELM CREEK DAM (DAM NUMBER 16), (IN--ETC(U)
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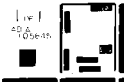

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Elm Creek Dam
Cattaraugus County
Allegheny River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and visual inspection of the Conewango Creek Watershed Elm Creek Dam (Dam No. 16) and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

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SECURITY CLASSIFICATION OF THIS PAGE

Sloughing of the south slope of the emergency spillway and the north upstream abutment contact was observed. In addition, significant erosion was observed on the upstream slope of the embankment. It is recommended that these conditions be evaluated further by a qualified registered professional engineer.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped under full PMF conditions. The PMF routed through the reservoir required only 55 percent of the spillway outflow capacity. The spillway capacity is, therefore, judged to be adequate.

The investigation recommended should be completed within 12 months of notification to owner, and remedial actions resulting from these investigations completed in the subsequent 12 months.

The following remedial measures should be performed within 1 year of notification to owner:

- Implement a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the gate system. Document this information for future reference.

- Remove the vegetation on the slopes and crest of the embankment and the immediate downstream channel. Provide a program of periodic cutting and mowing of these surfaces.

- Clean debris from the trash racks and upstream slopes periodically.

- Backfill ruts and drainage gullies in an acceptable engineering manner.

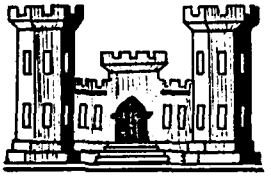
- Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.

ALLEGHENY RIVER BASIN

CONEWANGO CREEK WATERSHED
ELM CREEK DAM (DAM No. 16)

CATTARAUGUS COUNTY, NEW YORK
INVENTORY No. N.Y. 593

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT, CORPS OF ENGINEERS

AUGUST 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the Investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event a finding that a spillway will not pass the Test Flood should not be interpreted as necessarily posing a highly inadequate condition. The Test Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Conewango Creek Watershed Elm Creek Dam (Dam No. 16)
State Located:	New York
County Located:	Cattaraugus
Stream:	Elm Creek
Basin:	Allegheny River
Date of Inspection:	April 3, 1981

ASSESSMENT

Examination of available documents and visual inspection of the Conewango Creek Watershed Elm Creek Dam (Dam No. 16) and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Sloughing of the south slope of the emergency spillway and the north upstream abutment contact was observed. In addition, significant erosion was observed on the upstream slope of the embankment. It is recommended that these conditions be evaluated further by a qualified registered professional engineer.

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Robert J. Farrell

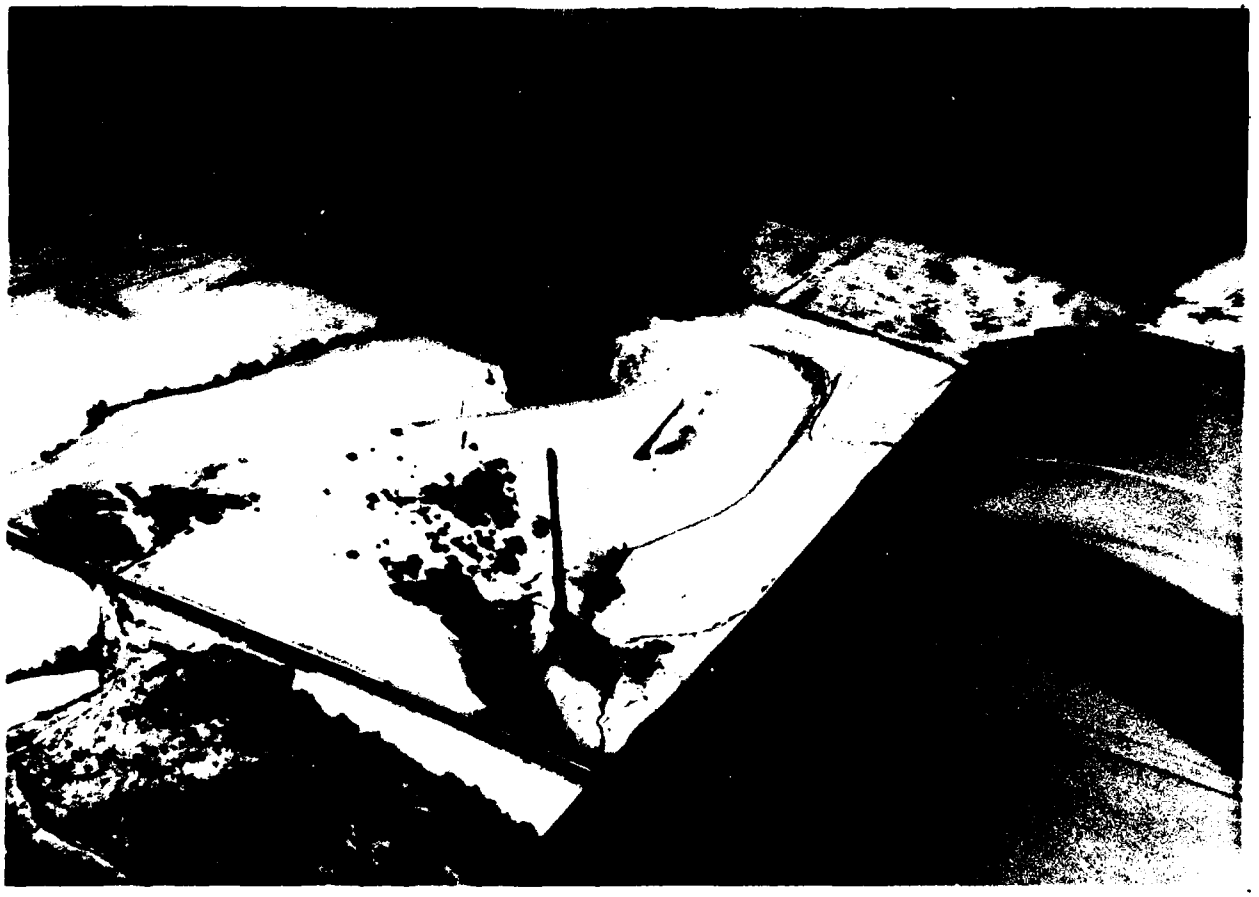
Robert J. Farrell, P.E.
New York No. 55983

Approved by:

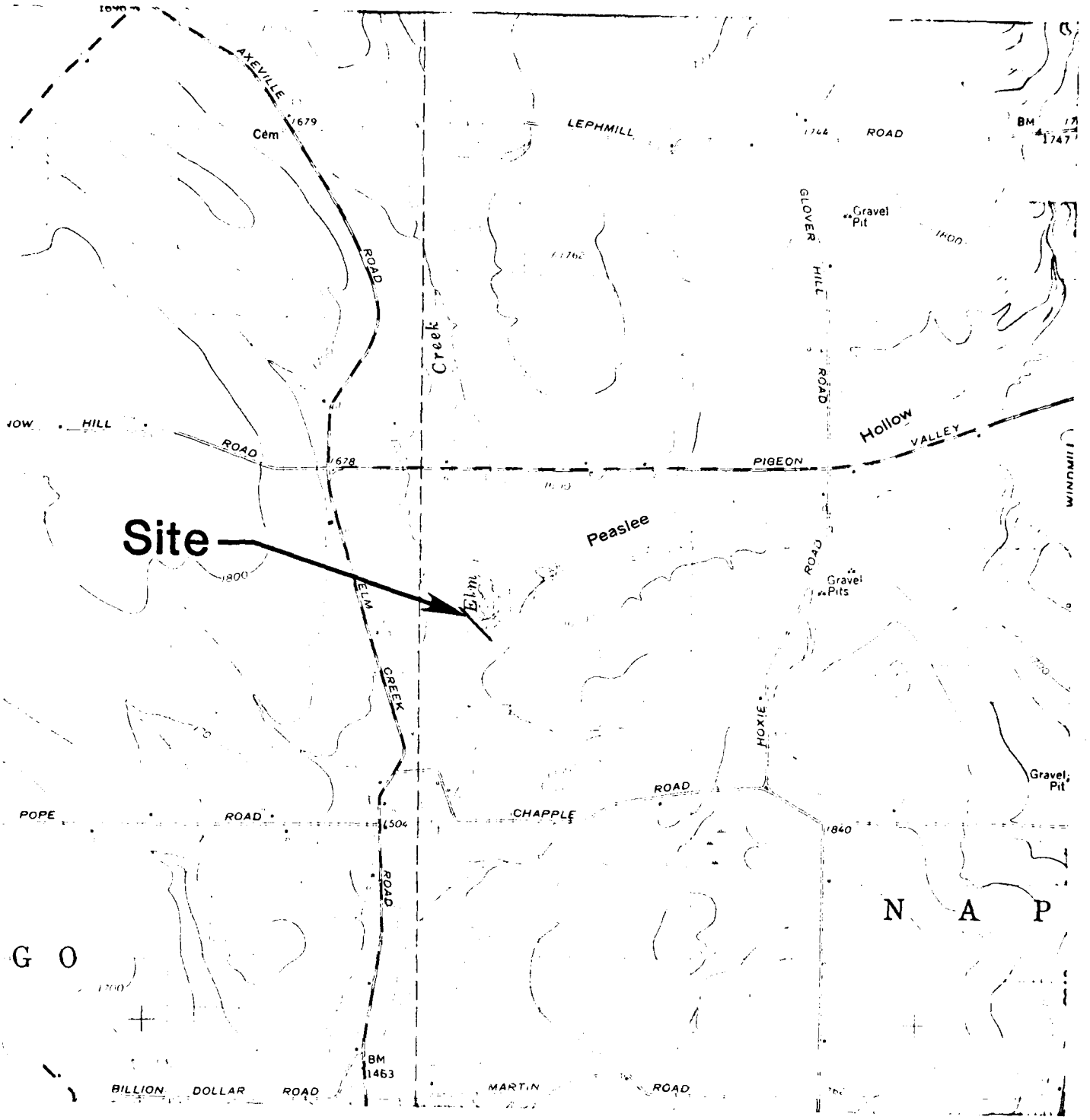
Col. W.M. Smith, Jr.
New York District Engineer

Date: 18 Aug 81

Elm Creek Dam (Dam No. 16)



AERIAL VIEW



Elm Creek Dam (Dam No 16)

LOCATION PLAN

Scale: 1"=2000'

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

CONEWANGO CREEK WATERSHED

ELM CREEK DAM (DAM NO. 16)

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the New York District Corps of Engineers in a letter dated 24 February 1981, in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, dated 8 August 1972.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a. Location

The Elm Creek Dam is located on Elm Creek approximately 4.5 miles north of the Village of East Randolph. It can be reached from Elm Creek Road which intersects New York State Rt 394 in East Randolph. The dam is shown on USGS Randolph, New York quadrangle with coordinates approximately at N42° 13' 20", W78° 56' 35" (see location plan). Page B-4 of Appendix B is a site plan for this dam.

b. Description of Dam and Appurtenances

The dam consists of a zoned earthfill embankment with an earthfill cutoff trench below; a principal spillway with a reinforced concrete riser structure and outlet pipe; and a vegetated earth channel emergency spillway located to the left of the dam embankment. The length of the dam is approximately 1000 ft. including the emergency spillway.

1) Dam Embankment

The embankment consists of a central core of semi-pervious clayey silt surrounded by a shell of silty clayey gravel. It is approximately 720 ft. long and a maximum of 51 ft. high.

The upstream slope is 3 horizontal to 1 vertical and the downstream slope is 2.5 horizontal to 1 vertical. The crest width is 16 ft.. There is a 10 ft. wide berm located on the upstream slope at the level of the low level inlet.

Beneath the embankment is an earthfill cutoff trench which is 14 ft. wide at the bottom. According to available plans it is constructed of the same silty clayey gravel material as the embankment shells.

The dam is founded in glacial till

2) Emergency Spillway

The emergency spillway is cut into glacial till in the south abutment. A diversion dike of compacted fill has been constructed on the north side of the downstream spillway channel. The dike and spillway have side slopes of 2.5 horizontal to 1 vertical. The grass covered channel curves around the south end of the dam embankment.

The control section is 280 feet wide and 20 feet long and the downstream channel is approximately 600 ft. long.

3) Principal Spillway

The principal spillway consists of a single stage reinforced concrete drop inlet structure with a sluice gate controlled inlet pipe, a 30 in. diameter water pipe supported on a concrete cradle and a reinforced concrete impact basin and baffle.

The inside dimensions of the riser structure are 16 ft. high and 5 ft. wide normal to the axis of the dam. It is 2.5 ft. long parallel to the embankment and has an 11 ft. by 3 ft. by 10 in. wall across the open top of the shaft normal to the axis of the dam. This wall supports a trash rack. The walls of the riser are 12 in. thick. The structure is founded on a 6.5 ft. by 7.5 ft. spread footing.

At the base of the structure is a 12 in. diameter, vertical lift, sluice gate inlet which is controlled by a wheel operated rising stem. A 12 in. diameter bituminous coated corrugated metal pipe extends 40 ft. upstream from the lift gate into the impoundment pool. Plans indicate a reinforced concrete inlet structure at the upstream end of this pipe which is protected by a trash rack of galvanized steel angles placed on an incline across the opening.

The single "high stage inlet" consists of a 2.5 ft. by 5 ft. open riser shaft. It is protected by a trash rack assembly constructed of galvanized steel angle sections. A galvanized steel grating forms the top of the trash rack assembly

The riser structure is drained by a 30 in. diameter reinforced concrete pressure pipe. It is approximately 232 ft. long and drops 3.0 ft. over that length. The pipe penetrates the downstream side of the riser structure and is supported by an 8 in. thick concrete cradle within the embankment. Plans indicate 7 reinforced concrete anti-seep collars cast around the pipe within the embankment.

The downstream end of the pipe penetrates the reinforced concrete impact basin. The inside dimensions of the impact basin are 14 ft. wide normal to the axis of the dam and 10.5 ft. long parallel to the embankment. It is 7.3 ft. high at the upstream face and tapers to 4.5 ft. at the downstream end. At the downstream end, there is a cutoff wall extending 3 ft. beneath the floor of the impact basin and there are two wingwalls extending 4 ft. beyond the walls of the basin parallel to the embankment. There is a 1 ft. thick by 4.6 ft. high baffle spanning between the walls of the impact basin.

4. Foundation and Embankment Drainage

A vertical seepage drain extends the full length of the embankment. It is of variable depth, 4 ft. wide and includes a system of 8 in. diameter perforated pipe over the section from 130 ft. north of the outlet to 50 feet south of the outlet. The pipe daylights on either side of the outlet conduit.

Four interceptor drains are located perpendicular to the seepage drain to collect flow parallel to the axis of the embankment and channel it into the seepage drain.

c. Size Classification

The dam's maximum impoundment of 3700 acre-ft and height of 51 ft. place it in the INTERMEDIATE size category according to the Corps of Engineers' Recommended Guidelines.

d. Hazard Potential Classification

The hazard potential classification for this dam is HIGH because of the significant economic losses and high potential for loss of life downstream in the event of dam failure. Section 5 of this report presents more detailed discussion of the hazard potential.

e. Ownership

The dam is owned by: Paul Gebbard
Elm Creek Road
East Randolph, New York 14730
Tele: (716) 358-4762

f. Operator

The dam is operated by: Conewango Creek Watershed Commission
Donald Crowell, Chairman
RD #2
S. Dayton, New York 14138
Tele: (716) 988-3300

g. Purpose of Dam

The purpose of this dam is to reduce downstream flooding by providing temporary storage for the runoff from 5120 acres. The temporary storage is released gradually through the single stage principal spillway system.

h. Design and Construction History

The dam was built under the Watershed Protection and Flood Prevention Act by the Elm Creek County Small Watershed Protection District with the assistance of the Soil Conservation Service. It was completed in 1964.

i. Normal Operating Procedure

The dam is normally self-regulating

1.3 Pertinent Data

a. Drainage Area

The drainage area for this dam covers 8 square miles. It is made up primarily of hilly woodland and pasture.

b. Discharge at Dam Site

1. Outlet Works

Normal discharge at the site is through the 30 in. diameter outlet pipe. In the event of severe flooding, water would flow over the emergency spillway at elevation 1580 ft. (MSL). The invert of the high stage orifice is at elevation 1554.5 ft. (MSL).

2. Maximum Known Flood

There is no data available for the maximum known flood at this dam site. Evidence of recent high water was observed atelevation 1570 ft. (MSL).

3. Ungated Spillway Capacity at Top of Dam

The capacity of the principal spillway with the reservoir at top of dam elevation 1587 ft. (MSL) is 128 cfs. The capacity of the emergency spillway with the reservoir at top of dam elevation is 24,750 cfs.

4. Ungated Spillway Capacity at Test Flood

The capacity of the principal spillway with the reservoir at test flood elevation 1584.1 ft. (MSL) is 122 cfs. The capacity of the emergency spillway is 13.454 cfs at this level.

5. Gated Spillway Capacity at Normal Pool

There are no gated spillways.

6. Gated Spillway Capacity at Test Flood

As previously mentioned, there are no gated spillways.

7. Total Spillway Capacity at Test Flood

The total spillway capacity at test flood elevation 1584.1 ft. (MSL) is 13,576 cfs.

c. Elevation (ft. above NGVD)

1. Streambed at toe of dam: 1536.0
2. Bottom of cutoff: variable, approximately 1314 minimum
3. Maximum tailwater - unknown, outlet conduit invert 1536.0
4. Normal pool: 1554. 5
5. Full flood control pool: 1578.0
6. Spillway crest - Pond Drain Invert: 1539.5
   Low level orifice: N/A
   High level orifice: 1554.5
   Emergency spillway: 1578.0
7. Design surcharge (original design): 1576.0
8. Top of dam: 1587.0
9. Test flood surcharge: 1584.1

d. Reservoir (Length in feet)

1. Length of maximum pool: 5200± ft.
2. Length of normal pool: 1900± ft.
3. Length of flood control pool: 4500± ft.

e. Storage (acre-feet)

1. Normal pool: 95
2. Flood control pool: 1982
3. Spillway crest pool:
   a. Low stage inlet: N/A
   b. High stage inlet: 95
   c. Emergency spillway: 1982
4. Top of dam: 3700
5. Test flood pool: 3142

f. Reservoir Surface (acres)

1. Normal pool: 18
2. Flood control pool: 143
3. Spillway crest pool:
   a. Low stage inlet: N/A
   b. High stage inlet: 18
   c. Emergency spillway: 143
4. Test flood: 224
5 Top of dam: 253

g. Dam

1. Type: Earth Embankment
2. Length: 720
3. Height: 51 ft.
4. Top Width: 16 ft.
5. Side Slopes:

   Upstream: 3H:1V
   Downstream: 2.5H:1V

6. Zoning: Semi-pervious core of clayey silt surrounded by silty clayey sand and gravel shells, trench drain under downstream embankment.
7. Impervious Core: Clayey silt
8. Cutoff: 14 ft. width, earthfill, silty clayey sand and gravel
9. Grout Curtain: None

h. Diversion and Regulating Tunnel

Not applicable

i. Spillways

1. Type:
   a. Principal Spillway: Reinforced concrete drop inlet
   b. Emergency Spillway: Grass covered earth channel constructed of compacted earthfill at the south end of the embankment
2. Length of Weir:
   a) Pond Drain: 12 in. diameter pipe
   b) Principal Spillway: 13.3 ft.
   c) Emergency Spillway: 280 ft.
3. Crest Elevation: (feet above NGVD)
   a) Pond Drain Invert: 1539.5
   b) Principal Spillway: 1554.5
   c) Emergency Spillway: 1578.0
4. Gates: 12 in. vertical lift gate on pond drain
5. Upstream Channel: Elm Creek, narrow stream to reservoir through farm and woodland
6. Downstream Channel: Elm Creek, narrow stream through farm and woodland

j. Regulating Outlet:

The only regulating outlet is a 12 in. diameter pipe controlled by a wheel operated sluice gate. The pipe invert is at elevation 1539.5 ft. (NGVD). The purpose of this outlet is pond drainage and it is normally closed.

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Bedrock at the dam site is upper Devonian Age (345-375 million years ago) known as the Canadaway Group. These relatively underformed and flat-lying sedimentary rocks consist of interbedded shales and siltstones. Regionally, the rock forms a homocline dipping southward to sowthwestward at approximately 40 feet per mile. Small terraces and low folds locally modify this dip to essentially flat-lying over short distances. Only minor folding and faulting are found in the region with no major or active faults known to exist in the area.

The Elm Creek Dam (Dam No. 16) is in a region classified as Zone 2 seismicity, as shown in Figure No. 1 of the Recommended Guidelines for Safety Inspection of Dams.

The Pleistocene glaciation (beginning 2 million years ago) of the area was extensive modifying topography by means of both erosion and deposition. The thick continental ice sheet moved southward from Quebec and Ontario smoothing terrain by glacial scour and mantling uplands with till deposits. The pleistocene geology of the dam site is that of flacial ground moraine deposits. A moderately stony, glacial till deposited by flowing ice of the continental ice sheet underlies coarse sand and gravel deposits. In recent times alluvium has been deposited on the glacial material via upslope erosion.

2.2 SUBSURFACE INVESTIGATION

Test hole logs are contained in the "As-Built" drawings. A total of 16 test pits and 3 drill holes were dug to determine subsurface conditions. The logs show that the dam is founded on glacial till.

2.3 DESIGN RECORDS

The records available for the project consists of 11 contract drawings which show the plans, sections and details of the dam, appurtenant structures, impact basin details and grating, fencing details, and logs of test holes; and a design report issued by the U.S. Soil Conservation Service dated July, 1963.

2.4 CONSTRUCTION RECORDS

Construction records and specifications are available at the U.S. Soil Conservation Service, Design Section, Syracuse, N.Y.

2.5 OPERATION RECORDS

No written maintenance of operation records exist for the dam

2.6 EVALUATION OF DATA

Information obtained from the "As-Built" drawings is consistent with observations made during this inspection. The information obtained from available data was considered adequate for the Phase I inspection and evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General

The Elm Creek Dam is in GOOD condition at the present time.

b. Dam

1) Earth Embankment (See Photos 1 and 2)

No animal burrows were noted and the slopes appear mown. This may be the result of grazing cattle at the site. There is accumulation of debris on the upstream slope.

Erosion gullies 24 in. wide and 6 in. deep were noted in the south downstream abutment contact and small (12 in.) gullies were noted in the natural slope downstream of the south contact. Erosion gullies were also noted around the wingwalls of the outlet structure.

There is no slope protection on the upstream slope other than the vegetative cover and a small area of rip rap near the inlet. Approximately 4 to 6 in. of erosion due to wave action was noted at the water line on the upstream slope. A pathway near the water line is aggrevating this condition.

The seepage drain under the downstream slope appears to be functioning properly as no seepage was noted at the dam. The outlets for the drain were completely submerged at the time of the inspection and could not be inspected.

The berms on the north upstream and downstream abutments are impounding runoff and provision should be made to drain these areas. A 6 ft. diameter slough has occurred along the north upstream contract.

2. Emergency Spillway (See Photos 1 and 5)

This spillway is in good condition with the exception of an area of sloughing at the cut slope on the south side of the channel. This appears to be the result of groundwater emanating the natural slope above.

c) Principal Spillway

1. Drop Inlet

The structure is in good condition, with only a minor amount of debris on the trash rack.

2. Impact Basin

The structure is in good condition.

3. Pond Drain

The pond drain was under water at the time of observation There was no handle on the stem of the gate to determine if the gate was operating properly.

d. Reservoir Area (See Photo 1)

The shore of the reservoir is generally shallow sloping pasture or woodland. It appears to be stable and in good condition.

e. Downstream Channel (See Photo 4)

The downstream channel is a narrow channel passing over relatively flat flood plain. There is rip rap protection of the plunge pool. A sink hole was noted approximately 30 ft. downstream of the outlet on the right bank above the rip rap.

3.2 Evaluation

The dam is generally in good condition. The potential problems noted during the visual inspection are listed below.

a. Erosion of the upstream face of the dam due to wave action.

b. Drainage gullies in the south downstream abutment contact and adjacent natural slope.

c. Sloughing of the south slope of the emergency spillway channel and the north upstream abutment contact.

d. Debris on upstream slope, and on trash rack over principal spillway.

e. Sinkhole in the north bank of the downstream channel.

f. Ponded water at berms on the upstream and downstream abutment contacts.

g. The operability of the drain gate for the pond drain.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation of the project consists of allowing water to flow through the service spillway outlet pipe.

4.2 MAINTENANCE OF DAM

It is reported that maintenance of the dam is performed when the need arises. Maintenance is not considered adequate as evidenced by trash racks, trees and brush, depressions, etc.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall condition of the dam and appurtenant structures appears to be good. Recommendations in connection with regular maintenance are discussed in Section 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Drainage Area Characteristics

Elm Creek Dam (Dam No. 16) is located on Elm Creek, a tributary of Conewango Creek in the Allegheny River Basin, and has a drainage area of 8.0 square miles. The dam is situated approximately 4.5 miles north of East Randolph, New York. The topography of the watershed is gentle rolling hills.

5.2 Design Data

The dam was designed as a Class C structure in accordance with criteria established in Washington Engineering Memorandum SCS-27. Under this classification, the emergency spillway is designed for a rainfall equal to P(100) + 0.26 [PMP-P(100)], while the freeboard pool is designed for the PMP rainfall.

The Soil Conservation Service (SCS) design calculations have been reviewed. The dam was designed to contain the runoff for the 100-year flood without discharging through the emergency spillway. The peak outflow is 105 cfs and the peak elevation is 1576.0 ft. (MSL). The SCS design allowed for a 50-year sediment accumulation with a storage of 95 acre-ft. The principal spillway consists of a 30 in. diameter reinforced concrete water pipe and a 2.5 ft. x 5.0 ft. reinforced concrete riser with two 5.0 ft. x 2.1 ft. openings. The riser has a 12 in. diameter pond drain with invert elevation of 1539.5 ft (MSL). The emergency spillway control cross section is 280 ft. wide, with side slopes of 2.5 horizontal to 1 vertical and a crest elevation of 1578.0 ft. (MSL). The dam crest elevation is 1587.0 ft. (MSL).

5.3 Analysis Criteria

The analysis of the spillway capacity of the dam and the storage of the reservoir was performed using the Corps of Engineers HEC-1 Dam Safety Version computer model. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated. The Probable Maximum Precipitation (PMP) was 22.7 in. (24 hours 200 sq. miles) from Hydrometerological Report #33 in accordance with the Recommended Guidelines of the Corps of Engineers. The dam is 51 ft. high and impounds approximately 3700 acre ft. at the top of the dam. The dam is classified as a HIGH hazard and INTERMEDIATE in size, according to the Recommended Guidelines of the Corps of Engineers. The spillway design flood is the Probable Maximum Flood (PMF). The floods selected for analysis were 20, 40, 50, 60, 80 and 100% of the PMF flows. The PMF inflow of 14,714 cfs was routed through the reservoir and the peak outflow was determined to be 13,576 cfs. The peak PMF outflow would produce an eroding velocity of 10.1 ft/sec. on the emergency spillway.

5.4 Reservoir Capacity

The reservoir capacities at the crest of the emergency spillway and at the top of the dam are 1892 acre-ft. and 3700 acre-ft, respectively. Surcharge storage between the emergency spillway crest and the top of dam is equivalent to 0.3 in. of runoff from the drainage area.

5.5 Experience Data

There are no flood records for the dam site, however, during the field investigation, evidence of recent high water was observed at elevation 1569.5 ft. (MSL) This reservoir elevation corresponds to a peak outflow of 84 cfs.

5.6 Overtopping Potential

The maximum capacity of the spillways is 24,698 cfs which is greater than the PMF peak outflow of 13,576 cfs. The dam is not overtopped by the PMF, the peak elevation being 2.9 ft. below the top of the dam.

5.7 Analysis of Downstream Impacts

During the field investigation, dwellings and highways located downstream of the dam were identified and referenced to the channel invert. The cross section locations used in the downstream channel routing are shown on Page D2, Appendix D. The impacts of the PMF on dwellings located downstream of the dam are shown in Table 5.1. For the purposes of this analysis, a danager of loss of life was assumed to exist if the computed PMF water surface was above the first floor elevation of a structure. This situation occurrs at 7 structures (Locations 2 and 3). The road corssings at locations 2 and 3 are overtopped during the PMF.

5.8 Evaluation

The spillway of Elm Creek Dam (Dam No. 16) will safely pass the PMF without overtopping. The spillway is therefore assessed as "Adequate". Potential problems include:

a. Erosion of the emergency spillway for the test flood conditions. Because of the low probability of occurrence of the PMF, and because there is no cost effective means of preventing the erosion, no preventative recommendations are deemed necessary.

b. The danger of loss of life and economic damage downstream of the dam for the test flood conditions.

TABLE 5.1

SUMMARY OF DOWNSTREAM IMPACTS FOR PMF

Location # (see page Appendix D)	Location	# of Dwellings	Structure Height above Streambed* (ft)	Peak Flow (cfs)	Peak Stage (ft)	Comments
-	At Dam	-	-	13,061	-	-
1	1600' d/s of dam	-	-	13,546	-	-
2	Pope Rd. Crossing	3 homes 2 trailers 1 home	15 8 11	13,550	12	Danger of loss of life. Road overtopped
3	3600' d/s of Location 2	1 home	7	13,553	11	Danger of loss of life. Road overtopped
4	1100' d/s of Location 3	1 home	25	13,555	10	-
5	2600' d/s of Location 4	-	-	13,545	-	-

* The structure height above the streambed is the difference in the first floor elevation and the channel invert.

SECTION 6 - STRUCTURAL STABILITY

6.1 Visual Observations

Sloughing has occurred along the left slope of the emergency spillway channel and the right upstream abutment contact. The embankment itself appears to be in good condition at the present time.

6.2 Design and Construction Data

Analyses conducted during the design and construction phase included a slope stability analysis by the Swedish circle method. The soil parameters assumed for this analysis were $\phi = 23^{\circ}$ and, c = 275 psf. The minimum factors of safety calculated were 1.27 for a 3:1 upstream slope for the sudden drawdown loading condition and 1.50 for a 2.5:1 downstream slope for the steady seepage loading condition. According to the results of this analysis, the use of a CL-ML central core would result in higher factors of safety. No analyses of the spillway slopes or abutments are available. The calculated factors of safety are judged to be marginally acceptable.

6.3 Post Construction Changes

There have been no known changes to any of the embankments or structures at this dam.

6.4 Seismic Stability

The dam is located in Seismic Zone No. 2 and, in accordance with the recommended Phase I guidelines, a seismic stability analysis is not warranted.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and visual inspections of the Conewango Creek Watershed Elm Creek Dam (Dam No. 16) and appurtenant structures did not reveal any conditions which constitute a hazard to human life or property. The dam and its appurtenances are considered to be in fair condition at the present time.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped for the spillway design flood of the full PMF. The principal and auxiliary spillway capacity are, therefore, judged as adequate.

b. Adequacy of Information

This report and its conclusions are based on visual inspection, interview data, contract drawings, and office hydrologic/hydraulic studies. This information and data are adequate for a Phase I inspection.

c. Need for Additional Investigations

It is recommended that the services of a qualified registered professional engineer be retained to evaluate:

a. the sloughing of the south slope of the emergency spillway and the north upstream abutment contact.

b. the erosion of the south downstream abutment contact and drainage of the berms on the north abutment slopes

c. recommendations for the installation of wave erosion protection on the upstream slope of the dam.

d. Urgency

The recommended investigation should be completed within 12 months of notification to owner and remedial actions resulting from these investigations completed in the subsequent 12 months. The remedial measures or actions listed beiow should be completed within one year from notification to owner.

7.2 RECOMMENDED MEASURES

a. The results of the aforementioned investigations will determine the remedial measures concerning the sloughing of the emergency spillway, erosion of the abutment contact and the wave erosion on the upstream slope of the dam.

b. Remove the vegetation on the slopes and crest of the embankment and the immediate downstream channel. Provide a program of periodic cutting and mowing of these surfaces.

c. Clear debris from the trash racks and upstream slopes periodically.

d. Backfill ruts and drainage gullies in an acceptable engineering manner.

e. Implement a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the gate system. Document this information for future reference.

f. Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Elm Creek Dam

Fed. I.D. # NY 00593 DEC Dam No. 14B-3226

River Basin Allegheny

Location: Town Napoli County Cattaraugus

Stream Name Elm Creek

Tributary of Conewango Creek

Latitude (N) 42° 13.4' Longitude (W) 78° 56.6'

Type of Dam Earth Embankment

Hazard Category High

Date(s) of Inspection April 3, 1981

Weather Conditions Sunny, 60°

Reservoir Level at Time of Inspection Approximately elevation 1554.9 ft.

b. Inspection Personnel Mr. Bob Farrell, Mr. Ken Avery, Mr. James Reynolds, Mr. Jeff Hardin

c. Persons Contacted (including Address & Phone No.)

U.S. Soil Conservation Service, Rm 771-Federal Bldg., So. Clinton Ave., Syracuse, N.Y.

State Construction Engineer: Philip "Skip" Nelson 1-315-423-5502

Area 1 Project Engr (Batavia): Pete Wright 1-716-343-3664

Contracting Office for Conewango Creek Watershed Commission: Dick Shields/1-716-267-4801

d. History:

Date Constructed 1964 Date(s) Reconstructed

Designer U.S.D.A. Soil Conservation Service

Constructed by

Owner

2) Embankment

a. Characteristics

(1) Embankment Material Silty clayey gravel

(2) Cutoff Type 14 foot wide trench, earthfill, silty clayey gravel

(3) Impervious Core Clayey silt

(4) Internal Drainage System 4 foot wide trench drain, 4 foot wide interceptor drains, 8" diameter pipe drains

(5) Miscellaneous

b. Crest

(1) Vertical Alignment Good

(Horizontal Alignment Good

(3) Surface Cracks None noted

(4) Miscellaneous

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1 vertical to 3 horizontal

(2) Undesirable Growth or Debris, Animal Burrows Debris on upstream slope should be cleared

(3) Sloughing, Subsidence or Depressions None noted

(4) **Slope Protection** None other than berm and grass cover, 4" - 6" of wave erosion at waterline

(5) **Surface Cracks or Movement at Toe** None noted

d. **Downstream Slope**

(1) **Slope (Estimate - V:H)** 1 vertical to 2.5 horizontal

(2) **Undesirable Growth or Debris, Animal Burrows** None noted

(3) **Sloughing, Subsidence, or Depressions** None noted

(4) **Surface Cracks or Movement at Toe** None noted

(5) **Seepage** None noted

(6) **External Drainage System (Ditches, Trenches, Blanket)** None

(7) **Condition Around Outlet Structure** 2" - 4" erosion gullies around wing wall

(8) **Seepage Beyond Toe** None noted

e. **Abutments - Embankment Contact**

Erosion gullies along left downstream contact and natural slope, slough at midheight of right upstream contact ponding of runoff behind berm on right abutment slopes

(1) **Erosion at Contact** Erosion gully along left downstream contact

(2) **Seepage Along Contact** None noted. Erosion is due to runoff

3) Drainage System

(a) Description of System 4 ft. wide seepage drain with perpendicular 4 ft. wide interceptor drains. 8" diameter perforated pipe in center section drains into outlet structure.

(b) Condition of System No seepage noted at dam outlet end of drain submerged

(c) Discharge from Drainage System Outlet submerged and could not be observed

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piczometers, etc.) None installed

5) Reservoir

a. Slopes Appear stable and in good condition

b. Sedimentation Very minor accumulation

c. Unusual Conditions Which Affect Dam None noted

6) Area Downstream of Dam

a. Downstream Hazard (No. of homes, highways, etc) Refer to Table 5.1 for a summary of downstream dwellings and highways

b. Seepage, unusual growth None noted

c. Evidence of movement beyond toe of Dam None noted

d. Conditions of Downstream Channel Good. 1 sinkhole 30 ft. downstream of outlet on right bank.

7) Spillway(s) (including Discharge Conveyance Channel)

Principal Spillway: Drop inlet structure with outlet conduit to impact basin

Emergency Spillway: 280 ft. wide with 2½ to 1 side slopes

a. General Good

b. Condition of Service Spillway Good

c. Condition of Auxiliary Spillway Good, except for sloughing of left slope over approximately 100 ft.

d. Condition of Discharge Conveyance Channel Good

8) Reservoir Drain/Outlet

Type: Pipe X Conduit ____ Other ____

Material: Concrete ____ Metal X Other ____

Size: 12" ID Length 40'

Invert Elevations: Entrance 1539.5 Exit 1538.5

Physical Condition (Describe): Unobservable X

Material: ____

Joints: ____ Alignment ____

Structural Integrity: ____

Hydraulic Capability: ____

Means of Control: Gate ____ Valve X Uncontrolled ____

Operation: Operable ____ Inoperable X Other ____

Present Condition (Describe): Handle missing

9) Structural

a. Concrete Surfaces N/A

b. Structural Cracking N/A

c. Movement - Horizontal & Vertical Alignment (Settlement) N/A

d. Junctions with Abutments or Embankments N/A

e. Drains - Foundation, Joint, Face N/A

f. Water Passages, Conduits, Sluices N/A

g. Seepage or Leakage N/A

h. Joints - Construction, etc. N/A

i. Foundation N/A

j. Abutments N/A

k. Control Gates N/A

l. Approach & Outlet Channels N/A

m. Energy Dissipators (Plunge Pool,etc) N/A

n. Intake Structures N/A

o. Stability N/A

p. Miscellaneous N/A

10) Appurtenant Structures (Power House, Lock, Gatchouse, Other)

a. Description and Condition None

APPENDIX B

ENGINEERING DATA

APPENDIX B

CONEWANGO CREEK WATERSHED PROJEC

ABOVE KENNEDY, NEW YORK

FLOODWATER RETARDING DAM NO. 16

ELM CREEK

DRAINAGE AREA	5120	ACRES
FLOOD STORAGE TO EMERGENCY SPILLWAY CREST	2322	AC FT
WATER SURFACE AREA AT SEDIMENT POOL	18	ACRES
HEIGHT OF DAM	49	FEET
VOLUME OF FILL	87,677	CUBIC YARDS

BUILT UNDER THE WATERSHED PROTECTION AND FLOOD PREVENTION ACT

by

ELM CREEK-COUNTY SMALL WATERSHED PROTECTION DISTRICT

WITH THE ASSISTANCE OF THE

SOIL CONSERVATION SERVICE

OF THE

U. S. DEPARTMENT OF AGRICULTURE

1964

INDEX

SHED PROJECT
YORK
M NO. 16

ACRES
AC FT

ACRES

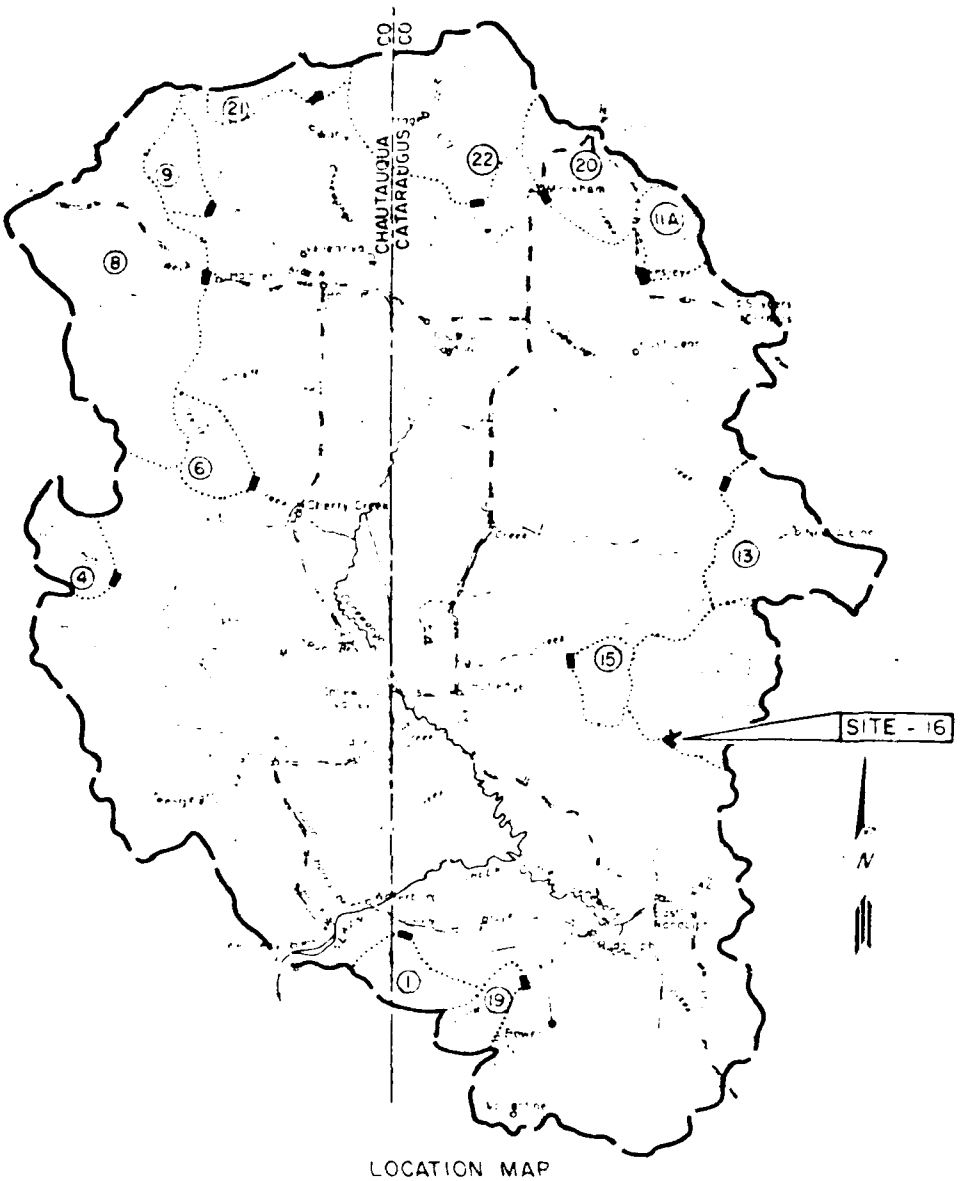
FEET
CUBIC YARDS

TECTION AND

TECTION DISTRICT

RE

SC. DETAILS



LOCATION MAP

AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
E. M. CREEK
COVER SHEET
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NY - 849 - P

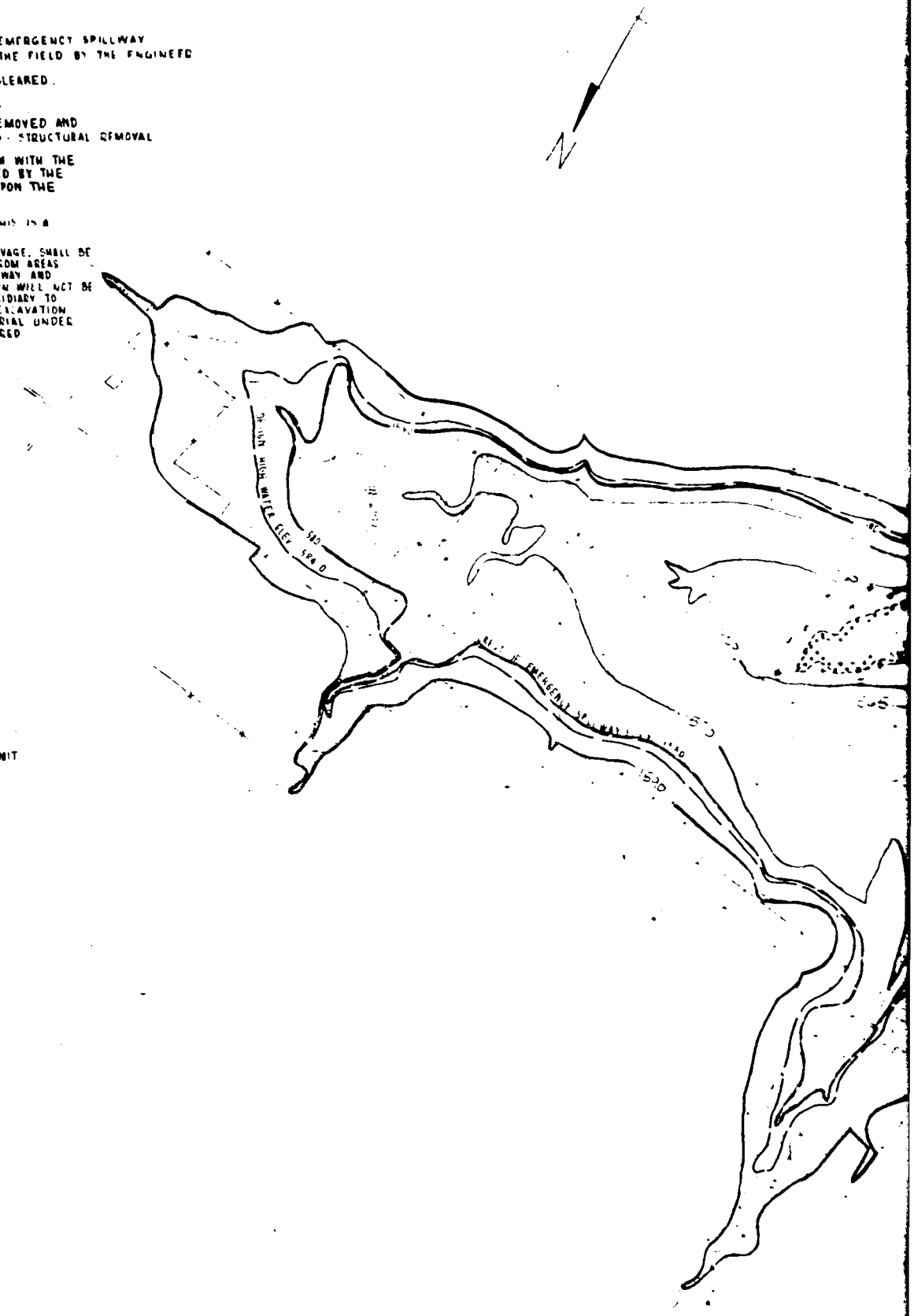
B-2

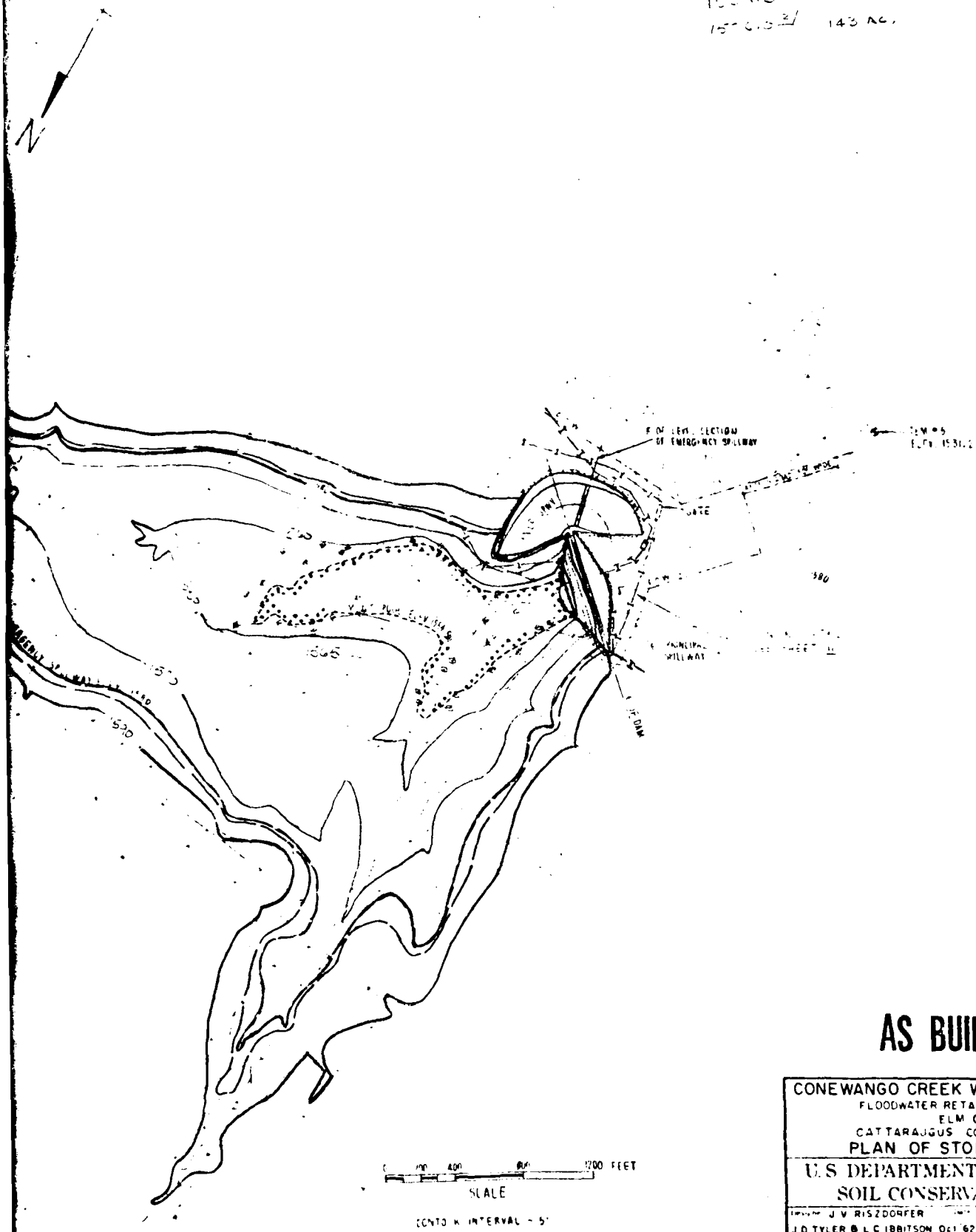
GENERAL NOTES:

1. CLEAR AND GRUB AREAS UNDER DAM, EMERGENCY SPILLWAY AND OUTLET CHANNEL AS STAKED IN THE FIELD BY THE ENGINEER.
2. AREA UNDER PERMANENT POOL WILL BE CLEARED.
3. ALL COMPACTED FILL TO BE CLASS B-2.
4. ALL FENCES IN WORK AREA WILL BE REMOVED AND SALVAGED. LUMP SUM PAYMENT ITEM-5- STRUCTURAL REMOVAL
5. INTERSECTION OF THE FACE OF THE DAM WITH THE ABUTMENTS TO BE SHAPED AS DIRECTED BY THE ENGINEER. PAYMENT WILL BE BASED UPON THE VOLUME OF MATERIAL USED.
6. 93 ROD FENCE SEE SHEET 11 THIS IS A PART OF THE CONTRACT
7. SOD AND TOPSOIL NOT DESIGNATED FOR SALVAGE, SHALL BE REMOVED TO A MAX DEPTH OF ONE FT FROM AREAS DESIGNATED AS BORROW, EMERGENCY SPILLWAY AND EMBANKMENT FOUNDATION. SUCH EXCAVATION WILL NOT BE PAID FOR, BUT WILL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS OF WORK. ANY ADDITIONAL EXCAVATION FOR THE REMOVAL OF UNSUITABLE MATERIAL UNDER THE EARTH EMBANKMENT WILL BE MEASURED AND PAID FOR AS COMMON EXCAVATION

LEGEND

- ROAD
- STREAM
- 1570 CONTOUR
- FENCE
- CLEARING
- CLEARING AND GRUBBING LIMIT
- NEW FENCE
- R O W RIGHT OF WAY





AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO. 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
PLAN OF STORAGE AREAS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Surveyed: J.V. RISZDORFER
J.D. TYLER & L.C. IBBITSON Oct '62
Drawn:
Traced:
W.H. MORGAN MAY 63
Checked:
F.M. WYSONG MAY 63

Sheet No. 2
NY-849-P

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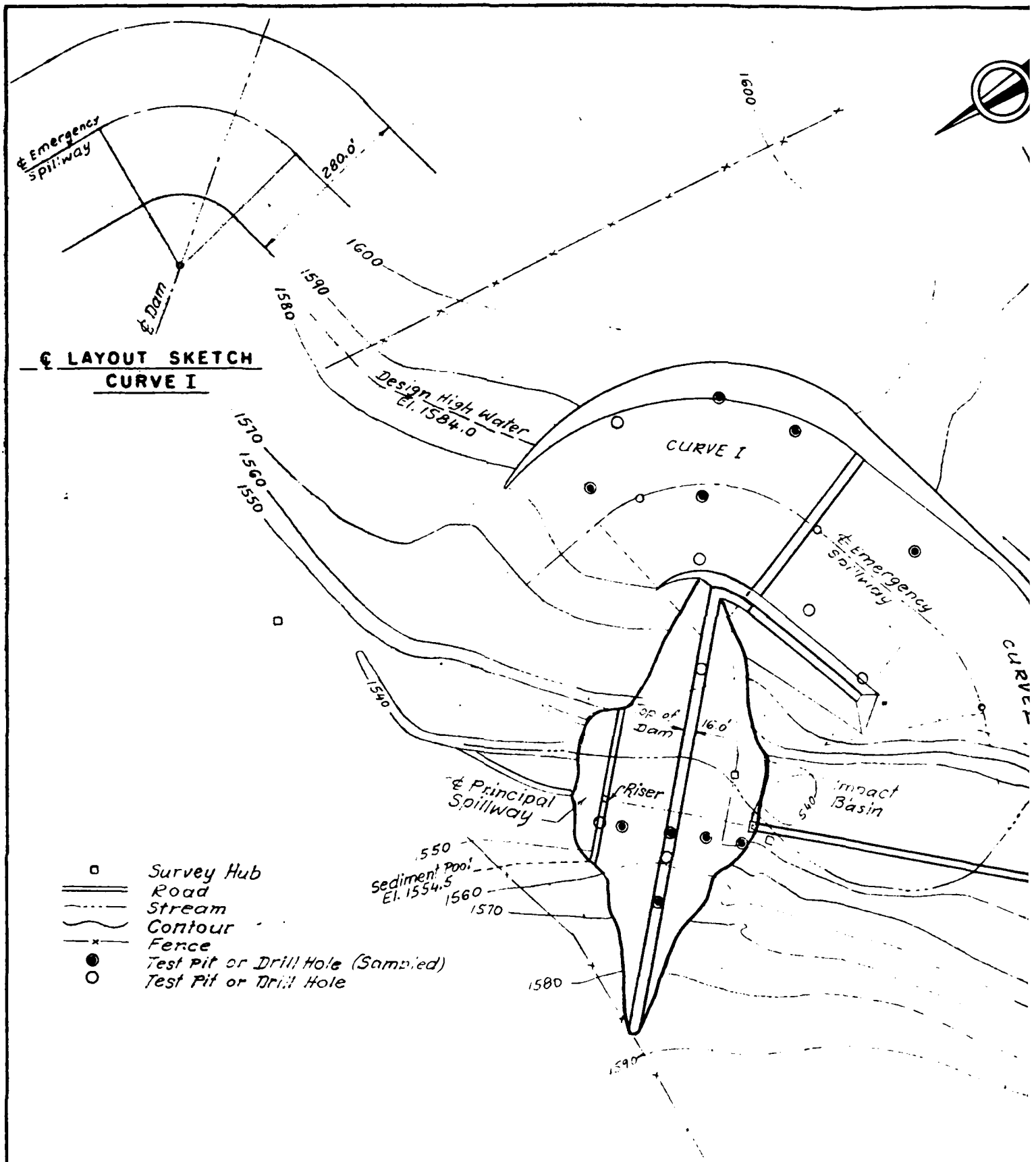
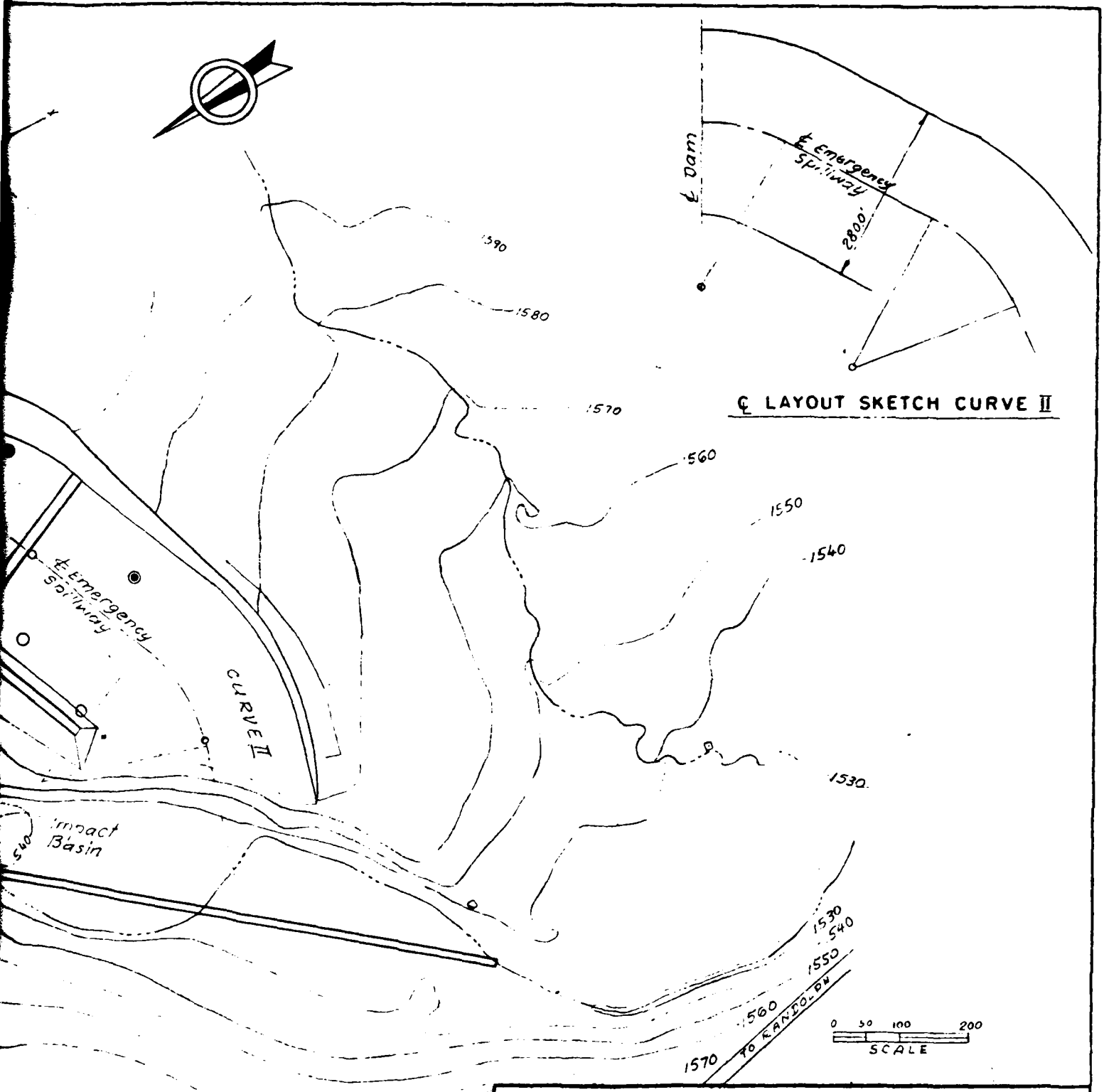
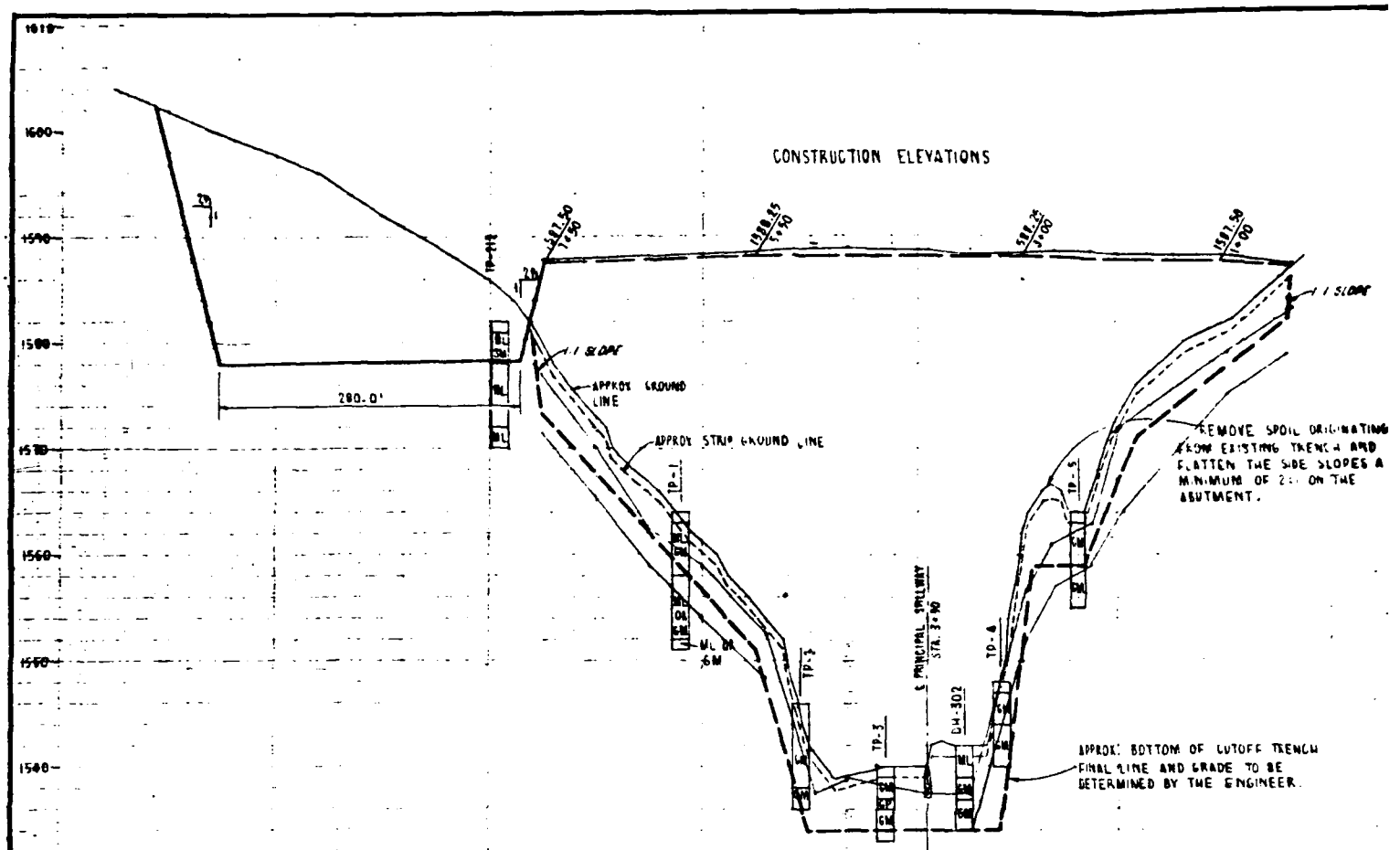

℄ Emergency Spillway
280.0'
℄ Dam
1600
1590
1580
℄ LAYOUT SKETCH
CURVE I
Design High Water
El. 1584.0
1570
1560
1550
CURVE I
℄ Emergency Spillway
CURVE
1540
Top of Dam
16.0'
℄ Principal Spillway
Riser
Impact Basin
540
1550
Sediment Pool
El. 1554.5
1560
1570
1580
1590
Survey Hub
Road
Stream
Contour
Fence
Test Pit or Drill Hole (Sampled)
Test Pit or Drill Hole



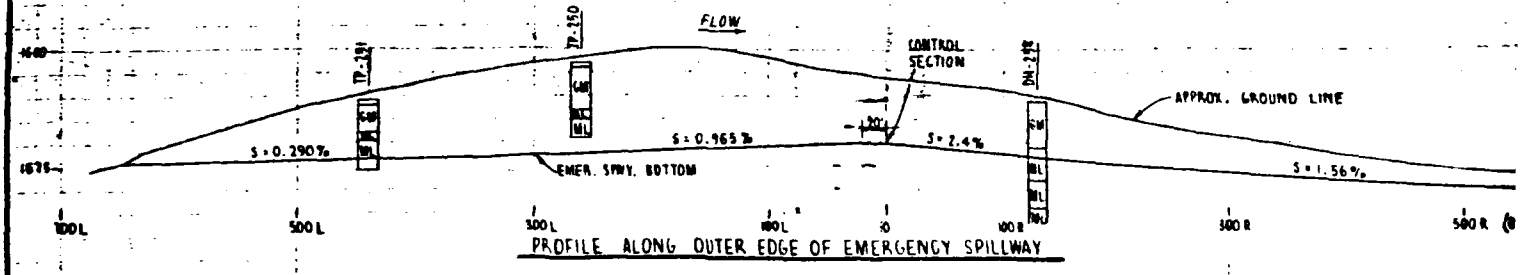
ELM CREEK DAM
NY00593

SITE PLAN

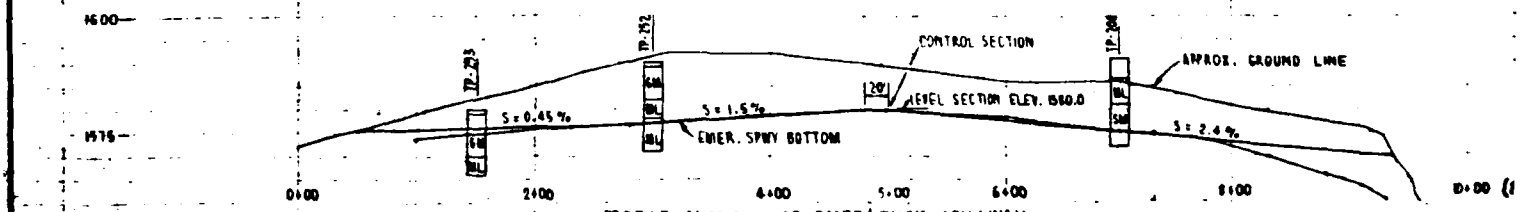
ERDMAN, ANTHONY, ASSOCIATES CONSULTING ENGINEERS & PLANNERS	DATE MAY 1981	FIGURE



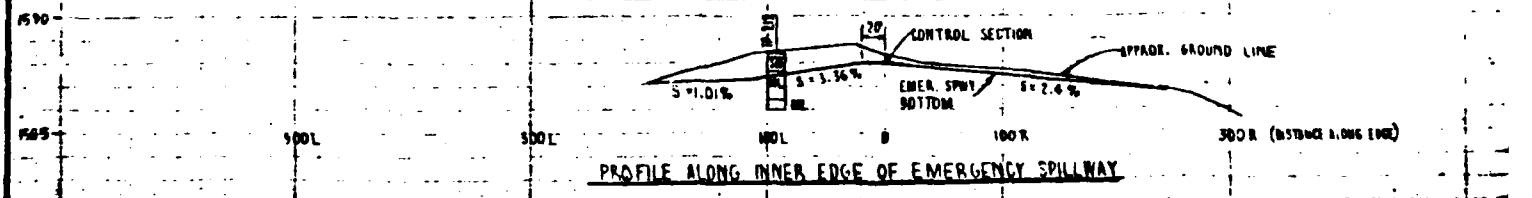
PROFILE ALONG ℄ OF DAM LOOKING DOWNSTREAM



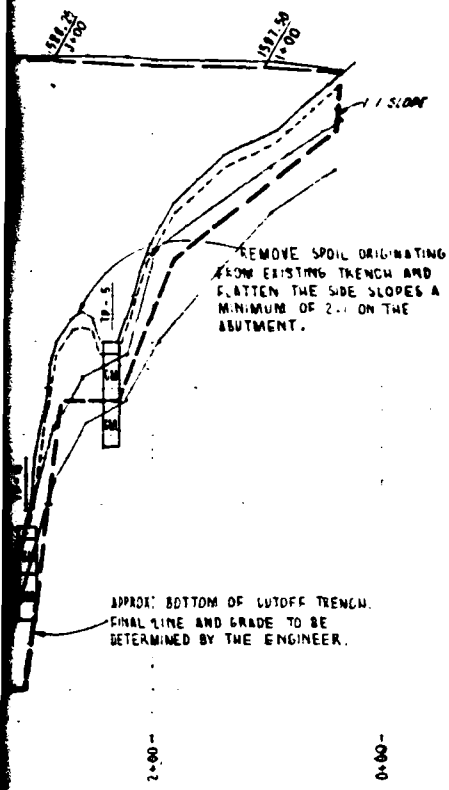
PROFILE ALONG OUTER EDGE OF EMERGENCY SPILLWAY

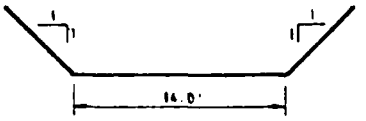


PROFILE ALONG ℄ OF EMERGENCY SPILLWAY

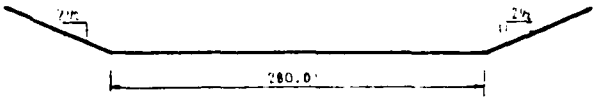


PROFILE ALONG INNER EDGE OF EMERGENCY SPILLWAY

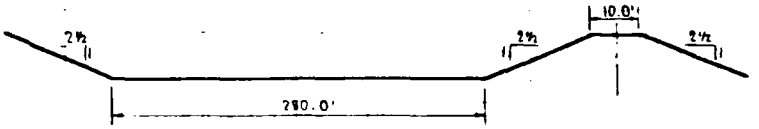




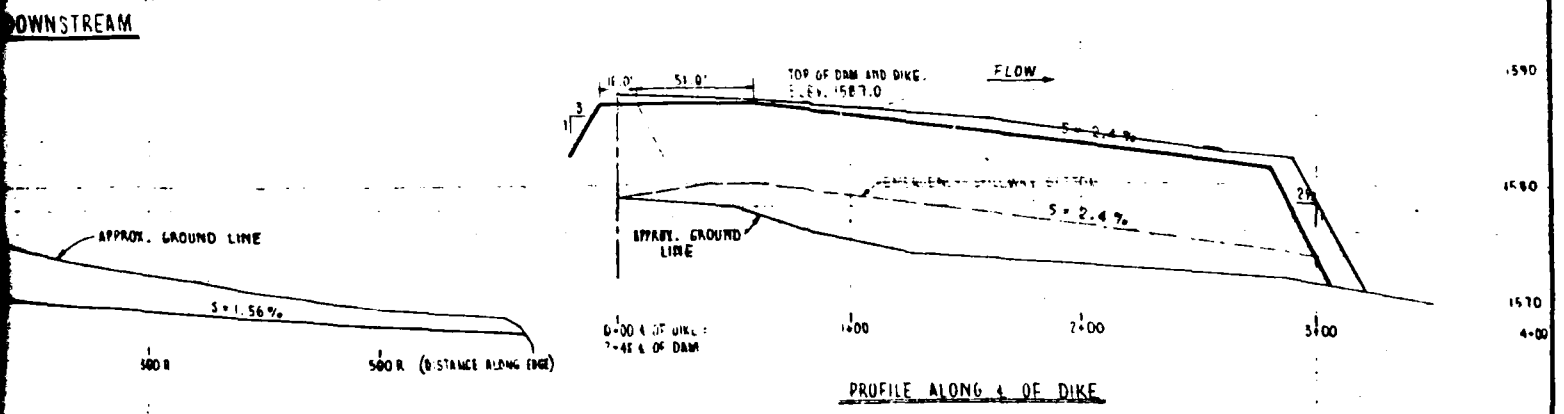
TYPICAL SECTION OF CUTOFF TRENCH



TYPICAL SECTION OF EMERGENCY SPILLWAY



TYPICAL SECTION OF EMERGENCY SPILLWAY AND DIKE



PROFILE ALONG ℄ OF DIKE

AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
PROFILES

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date
J.V RISDORFER	May '63
Drawn L IBBITSON	Oct '62
W H MORGAN	MAY '63
Traced	
Checked F. M WYSONG	May '63

Approved by
Title
Title

Sheet No. 6 of 11
Drawing No. NY - 849 - P

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TEST PITS (BACKHOE)

TP 1, ELEV. 15[illegible]

0.0	1.0	Topsoil	
1.0	6.0	Silt - (45%) gravels, max. size 3" to 4" - light brown turning dark brown at 8' - dense - slight perm. - moist.	(ML or GM)
6.0	12.0	Same as above, except gradational color change to a dark brown.	(ML or GM)
12.0	13.0	Silt - large percent of sands and gravels - blue gray - dense - slight perm. - moist to wet.	(ML or GM)

TP 2, ELEV. 1546

0.0	8.0	Silty gravel, 35+ fines; brown - very dense - slight perm. - moist (glacial till).	(GM)
8.0	10.0	Silty gravel (35-40%) fines, blue gray - very dense, slight perm., moist to wet (glacial till).	(GM)

TP 3, ELEV. 1540

0.0	1.0	Topsoil	
1.0	3.0	Gravel - some sand and silts - some cobbles up to 8" - 10" - brown - mod. dense - mod. perm. - wet.	(GM)
3.0	4.0	Gravel - clean, with some sand - brown - mod. dense - high perm. - wet, heavy seepage.	(GP)
4.0	7.0	Silty gravel - high percentage of fines, blue gray - very dense - slight perm. - moist (glacial till).	(GM)

TP 4, ELEV. 15[illegible]

0.0	1.0	Topsoil	
1.0	4.0	Silty gravel - (35%) fines - brown - very dense - slight perm. - moist (till).	(GM)
4.0	8.0	Silty gravel - (35-40%) fines - blue gray - very dense - slight perm. - moist (till).	(GM)

TP 5, ELEV. 1564

0.0	1.0	Topsoil	
1.0	6.0	Silty gravel - (35%) fines - brown - very dense - slight perm. - moist (till).	(GM)
6.0	9.0	Silty gravel - (35-40%) fines - blue gray - very dense - slight perm. - moist (till). D. S. 2'-9'.	(GM)

TP [illegible]08, ELEV. 1592

0.0	0.1	Topsoil	
1.0	4.5	Silt or sand - about 20% gravel - occasional 4" to 6" rounded cobbles - brown and gray mottled - dense to very dense - slight perm. - moist.	(ML (SM)
4.5	10.0	Silt - some clay and sandy zones - brown dense - slight perm. - moist.	(ML)
10.0	19.0	Silt - some clay and sandy zones - bluish gray - dense - slight perm. - higher moisture. D. S. 4.5-10'	(ML)

TP 211, ELEV. 1500

0.0	1.0	Topsoil	
1.0	3.0	Silt - high percentage of sand - about 30% gravel, brown and gray mottled - dense to very dense - slight perm. - moist.	(ML)
3.0	5.0	Sand - medium grain - some silt - brown - somewhat loose - high perm. - moist.	(SP)
5.0	10.0	Silt - some sand - some gravel - brown - dense to very dense - slight perm.	(ML)
10.0	17.0	Silt - some gravel - blue gray - mod. dense - slight perm. - moist to wet.	(ML)

TP 21[illegible], ELEV. 15[illegible]

0.0	1.0	Topsoil	
1.0	4.0	Silt or sand - about 20% gravel - quite a few 3" to 5" cobbles - brown and gray mottled - dense to very dense - slight perm. - moist.	(ML (SM)
4.0	10.0	Silt - some sand - about 30% gravel - brown - dense - slight perm. - moist.	(ML)
10.0	12.0	Silt - some sand - some gravel - blue gray - dense - slight perm. - moist.	(ML)

TP 213, ELEV. 1576

0.0	1.0	Topsoil	
1.0	2.5	Sand - high in silts - about 20% gravel - many 3" - 5" rounded cobbles - brown and gray mottled - dense - slight perm. - moist.	(SM)
2.5	8.0	Mixture of pure fine sand - silts and some clay.	
8.0	9.0	Silt - little sand and clayey in spots - mod. dense - slight [illegible] perm. - moist.	(ML)

[illegible]

[illegible]	[illegible]	Topsoil	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	Silt, clean, [illegible], dense, moist [illegible]	
[illegible]	[illegible]	[illegible]	

[illegible]

[illegible]	[illegible]	Topsoil	
[illegible]	[illegible]	Gravel - [illegible] - dense - moist.	
[illegible]	6.5	Silt - nearly pure - brown - fairly loose - moist.	
6.5	15.[illegible]	Silt - nearly pure - blue gray - fairly loose - moist (entire hole - slight perm.).	

TP 250, ELEV. 15[illegible]

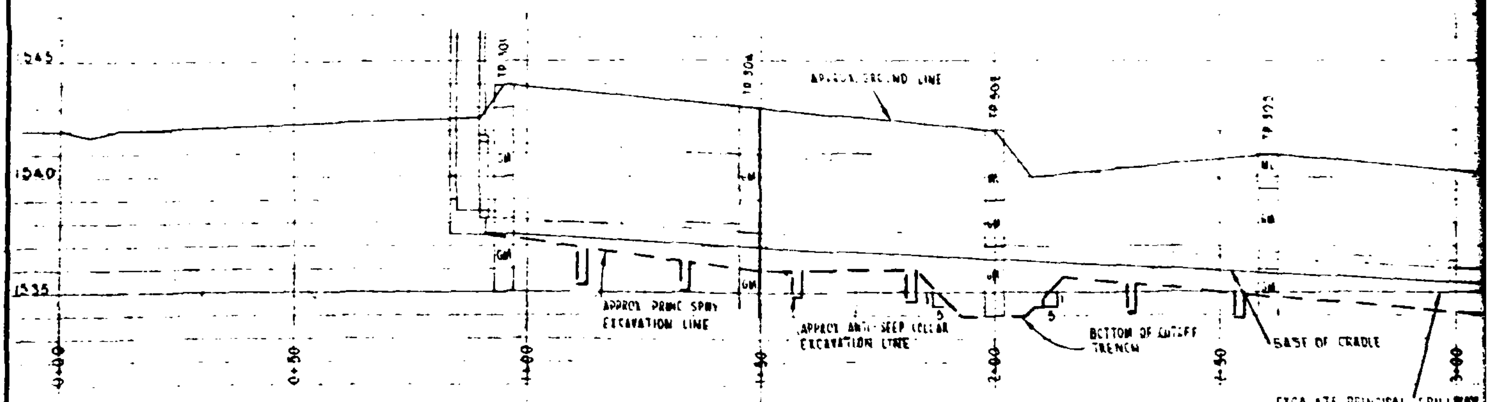
0.0	1.0	Topsoil	
1.0	6.0	Gravel - 45% silt - brown - dense - slight perm. - moist.	
6.0	12.0	Gravel - 15% silt - brown - dense - slight perm. - wet, with some seepage. D. S. 8 - 12	
12.0	19.0	Silt - nearly pure, with occasional 1/4" pebbles - blue gray - mod. dense - slight perm. - wet on top from H_2O in gravels.	

TP 25[illegible], ELEV. 15[illegible]

0.0	1.0	Topsoil	
1.0	10.0	Silty gravel - 45% fines - brown - dense - moist.	
10.0	14.0	Silt - nearly pure - blue gray - mod. dense - slight perm. - moist. D. S. 2 - 14	

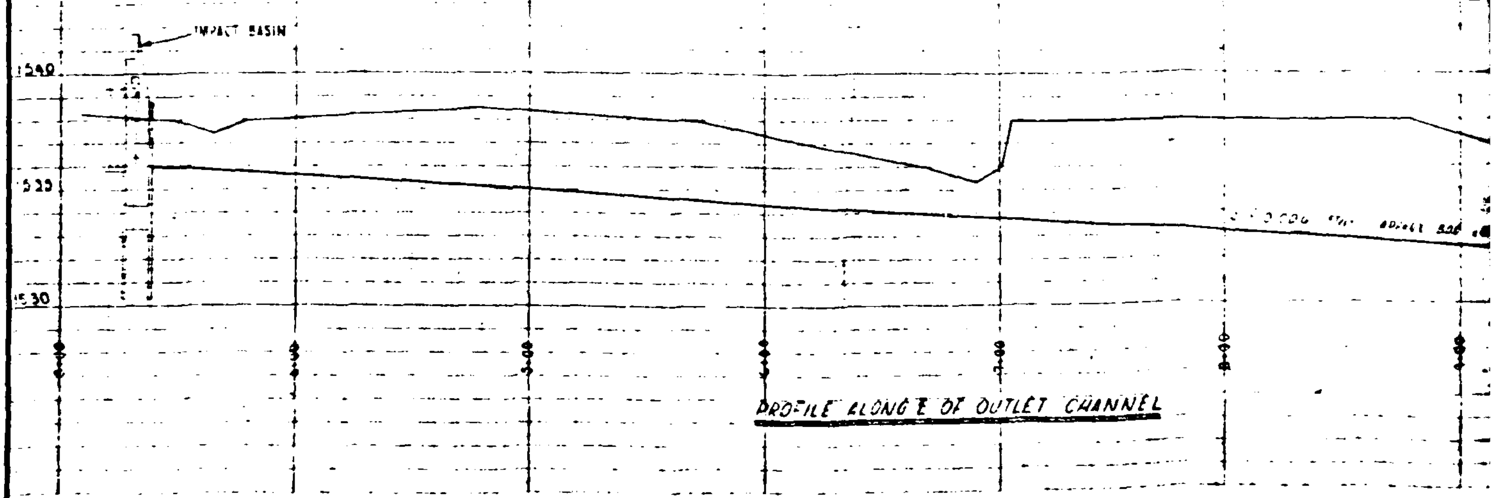
TP 301, ELEV. 1564

0.0	1.0	Topsoil	
1.0	4.0	Silty gravel - some sands - brown, dense - mod. to high perm. - moist to wet.	
4.0	9.0	Silt, gravel - (45%) fines - gray, very dense - slight perm. - moist (till).	



PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY

EXCAVATE PRINCIPAL SPILLWAY A MINIMUM OF ONE FOOT [illegible] GLACIAL TILL. BACKFILL [illegible] AS SPECIFIED ON SHEET [illegible]



PROFILE ALONG ℄ OF OUTLET CHANNEL

[illegible], ELEV. [illegible]

[illegible]	Topsoil	
1.[illegible]	[illegible] gravel - [illegible] fines - [illegible] 1" flags - brown - dense - [illegible]	
1.[illegible]	Silt, clean, brown, dense, moist DS [illegible]-10' [illegible]	
1[illegible]	Silt - nearly pure - [illegible] - fairly loose - moist - [illegible] material	

[illegible], ELEV. 15[illegible]

1.[illegible]	Topsoil	
7.[illegible]	Gravel - [illegible] silt - brown - dense - moist.	(GM)
[illegible].5	Silt - nearly pure - brown - fairly loose - moist.	(ML)
15.[illegible]	Silt - nearly pure - blue gray - fairly loose - moist (entire hole - slight perm.).	(ML)

[illegible], ELEV. 15[illegible]

1.0	Topsoil	
8.0	Gravel - [illegible]% silt - brown - dense - slight perm. - moist.	(GM)
12.0	Gravel - 15% silt - brown - dense - slight perm. - wet, with some seepage. D. S. 8 - 12	(GM)
19.0	Silt - nearly pure, with occasional 1/4" pebbles - blue gray - mod. dense - slight perm. - wet on top from H_2O in gravels.	(ML)

[illegible], ELEV. 15[illegible]

1.0	Topsoil	
10.0	Silty gravel - 45% fines - brown - dense - moist.	(GM)
14.0	Silt - nearly pure - blue gray - mod. dense - slight perm. - moist. D. S. 2 - 14	(ML)

[illegible], ELEV. 15[illegible]

1.0	Topsoil	
4.0	Silty gravel - some sands - brown, dense - mod. to high perm. - moist to wet.	(GM)
9.0	Silt, gravel - (45%) fines - gray, very dense - slight perm. - moist (till).	(GM)

TP 50[illegible], ELEV. 1542

0.0	[illegible]	Silt - some sand - brown - fairly loose - slight to mod. perm. - moist.	(ML)
[illegible]	5.0	Silty gravel - fairly high in fines - brown - mod. dense - mod. perm. - moist to wet. D. S. 5' - 5'	(GM)
5.0	[illegible]	Silty gravel - (45%) fines - gray - very dense - slight perm. - moist, (glacial till).	(GM)

TP 50[illegible], ELEV. 1540

0.0	1.0	Topsoil	
1.0	5.0	Gravel - occasional flags up to 12" - fairly clean - mod. dense - brown - mod. perm. - wet to saturated, some seepage. D. S. 2' - 5'	(GW)
5.0	8.0	Silty gravel - (45%) fines - gray - very dense - slight perm. - moist to wet (glacial till). D. S. 5'-6'	(GM)

DH [illegible]A, ELEV. 15[illegible]

N	Depth	USC	Description
55	0.0		Topsoil
	1.0	GM	Silty gravel - (40%) fines - brown - mod. dense - slight perm. - moist.
50			
82	10.0	ML	Silt - occasional small gravels - dense - bluish gray - slight perm. - moist to wet.
90			
	17.0	ML	Silt - little or no gravel - blue gray - mod. dense - slight perm. - moist to wet.
68			
56	23.0	ML	Silt - high percentage of gravel - blue gray - dense - slight perm. - moist to wet.
	26.0		

DH 504, ELEV. 1543

N	Depth	USC	Description
6	0.0	GM	Silty gravel - fairly high percent of fines - brown - mod. dense to dense - slight to mod. perm. - moist to wet.
7			
17			
80			
44	6.0	GM	Gravel - high in fines - blue gray - very dense - slight perm. - moist to wet (glacial till).
67			
60			
70			
69			
115	15.0		

DH 505, ELEV. 1541

N	Depth	USC	Description
3	0.0	ML	Silt - some sand - chocolate brown - fairly loose - slight to mod. perm. - moist.
7	[illegible]	GM	Gravel - fairly high in fines - brown - dense - slight to mod. perm. - moist.
55			
95	[illegible]	GM	Gravel - high in fines - blue gray - very dense - slight perm. - moist to wet (glacial till).
53			
50			
59			
70			
68			
77	15.0		

LEGEND

N - NUMBER OF BLOWS REQUIRED FOR 1 FT. STANDARD PENETRATION, USING 2.0" O.D. SPLIT BARREL SAMPLER, 140 LB HAMMER, AND 30" DROP. ASTM D 1586

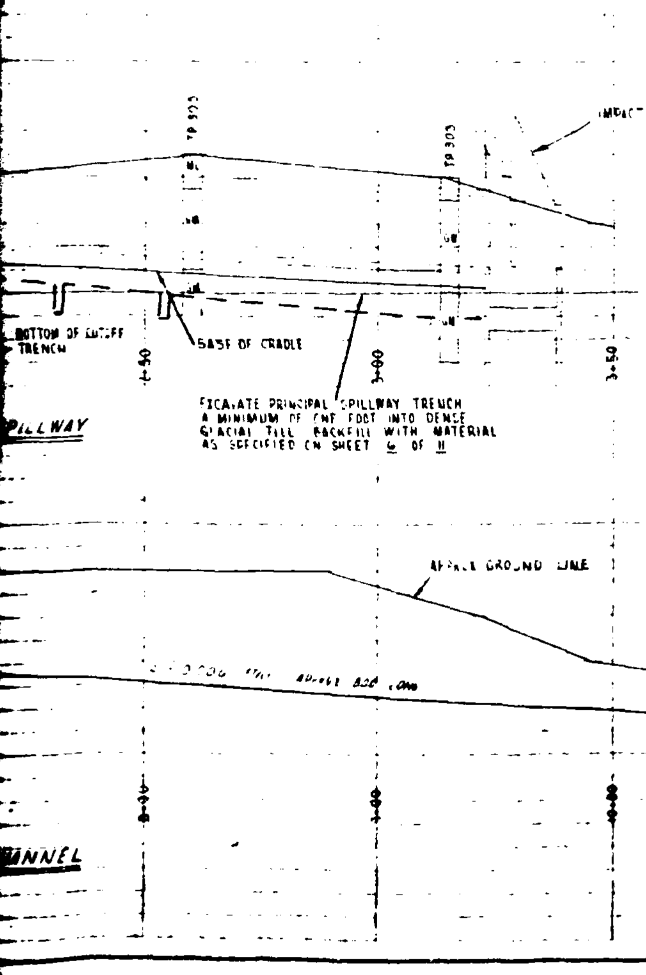
N = 22

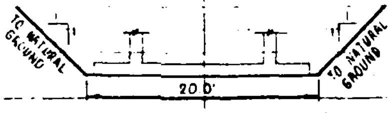
9.0 DEPTH IN HOLE (FT)

CL UNIFIED SOIL CLASSIFICATION SYMBOL

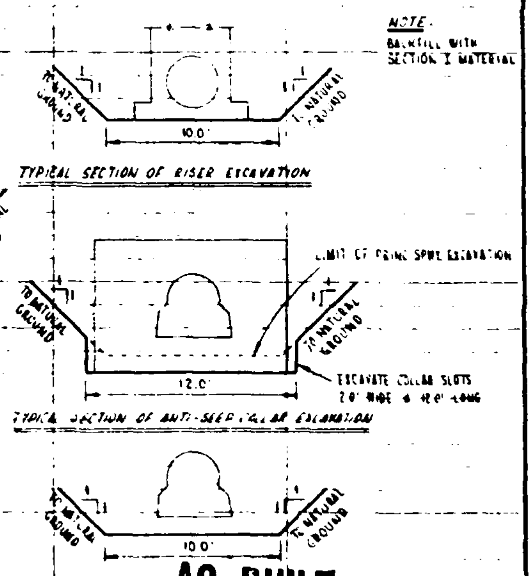
12.0

ALL SOIL AND ROCK DESCRIPTIONS AND CLASSIFICATIONS WERE DETERMINED BY VISUAL EXAMINATION.





TYPICAL SECTION OF EXCAVATION - IMPACT BASIN



TYPICAL SECTION OF RISER EXCAVATION

TYPICAL SECTION OF ANTI-SEEP COLLAR EXCAVATION

TYPICAL SECTION OF [illegible] EXCAVATION

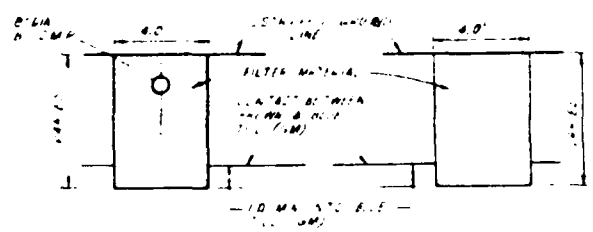
AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK

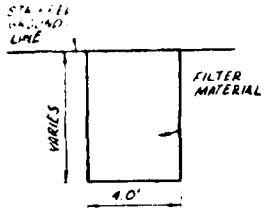
PROFILES AND SOILS DATA

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: J V RISZDORFER	Date: MAY '63	Approved by
Drawn: H T BROWNING JR	JULY '63	Title
Traced		Title
Checked: F M WYSONG	JULY '63	Sheet No. 5 of 11 — Drawing No. NY - 849 - P



SECTION A-A SECTION B-B



TYPICAL SECTION OF INTERCEPTOR DRAIN

NOTES:

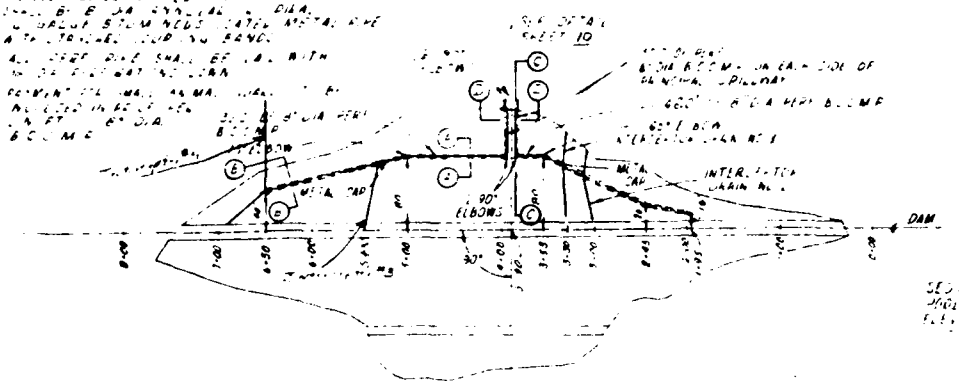
SECTION I

COMPACTED FILL CLAY, B-2 USE SILTY CLAYEY GRAVEL (GM-GC REPRES BY THE LOG OF TEST PIT NO 252 FR 10 TO 80 FEET

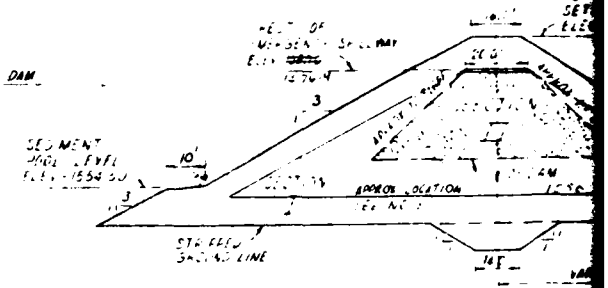
SECTION II

COMPACTED FILL CLAY, B-9 SILTY CLAY CL-ML MATERIAL REPRESENTED BY TH OF TEST PIT NO 251 FROM 30 TO FEET TO BE PLACED IN CENTER SE OF FILL AS DIRECTED BY THE ENGINEER

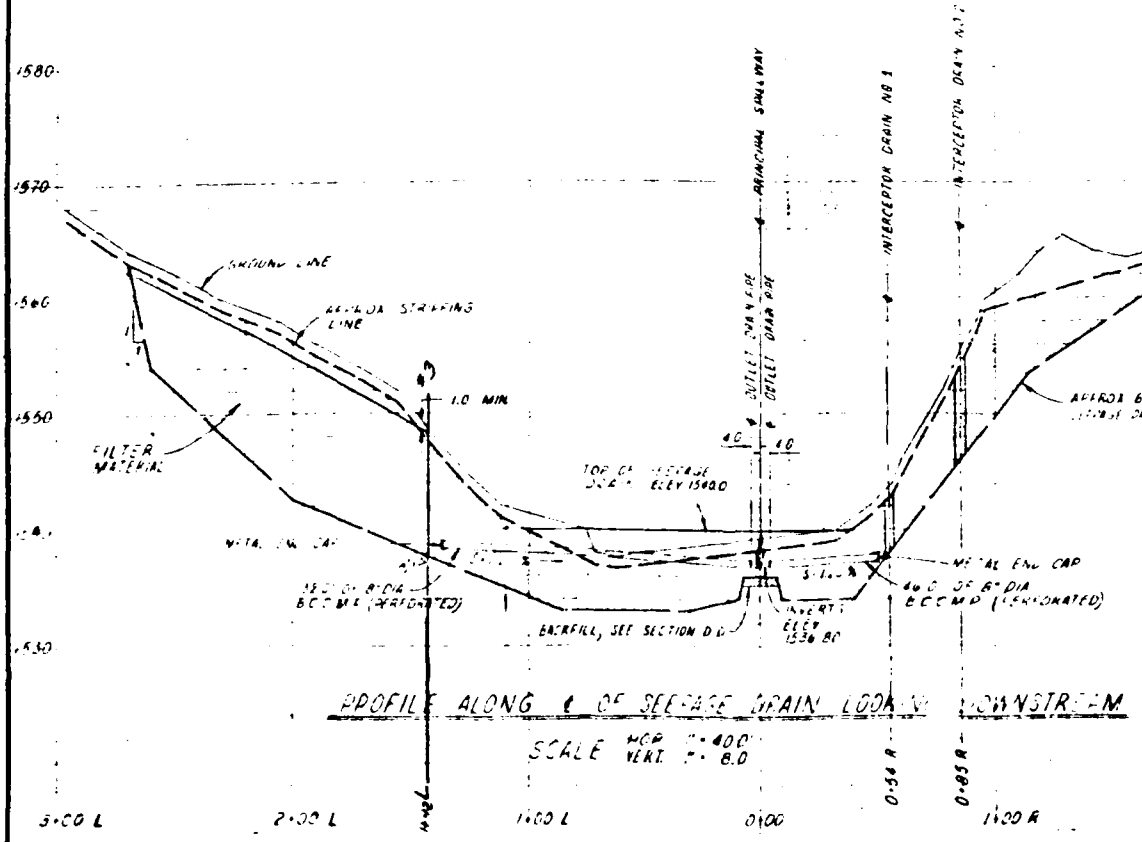
NOTES



PLAN OF SEEPAGE DRAIN



TYPICAL CROSS CTION O



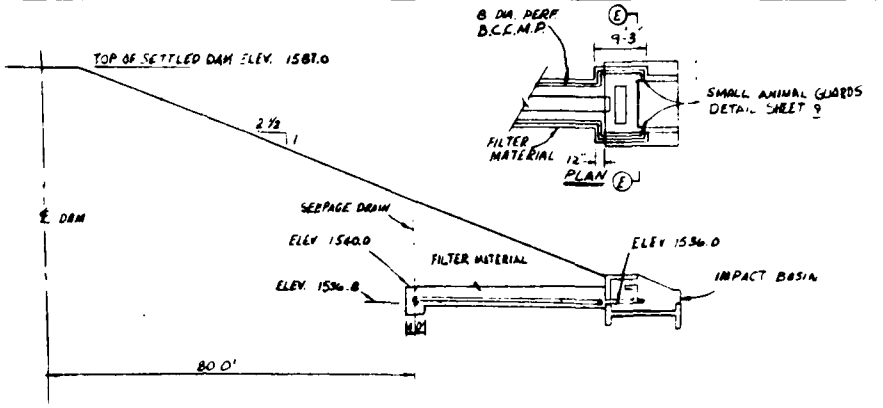
NOTES:

SECTION I

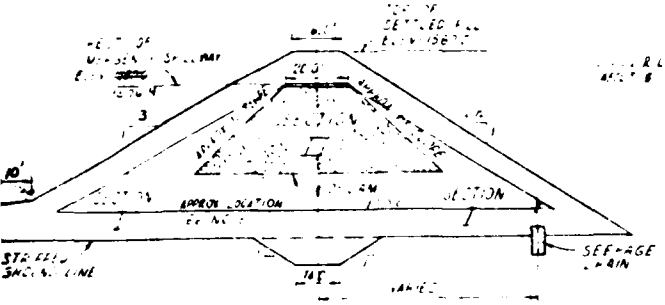
COMPACTED FILL CLASS B-2 USE SILTY CLAYEY GRAVEL (GM-GC) REPRESENTED BY THE LOG OF TEST PIT NO 252 FROM 10 TO 80 FEET

SECTION II

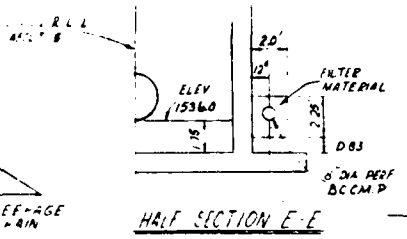
COMPACTED FILL CLASS B-2 SILTY CLAYEY (SC-M) MATERIAL REPRESENTED BY THE LOG OF TEST PIT NO 251 FROM 70 TO 150 FEET TO BE PLACED IN CENTER SECTION OF FILL AS DIRECTED BY THE ENGINEER



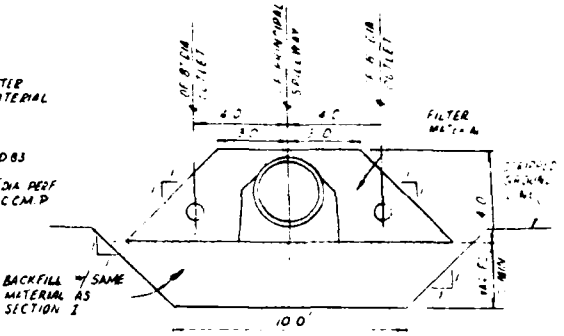
SECTION CC



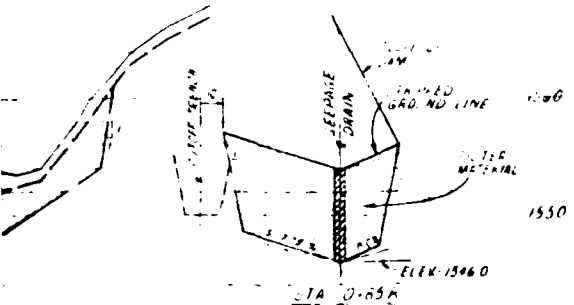
TYPICAL CROSS SECTION OF DAM



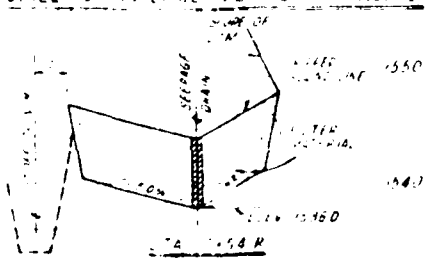
HALF SECTION E-E



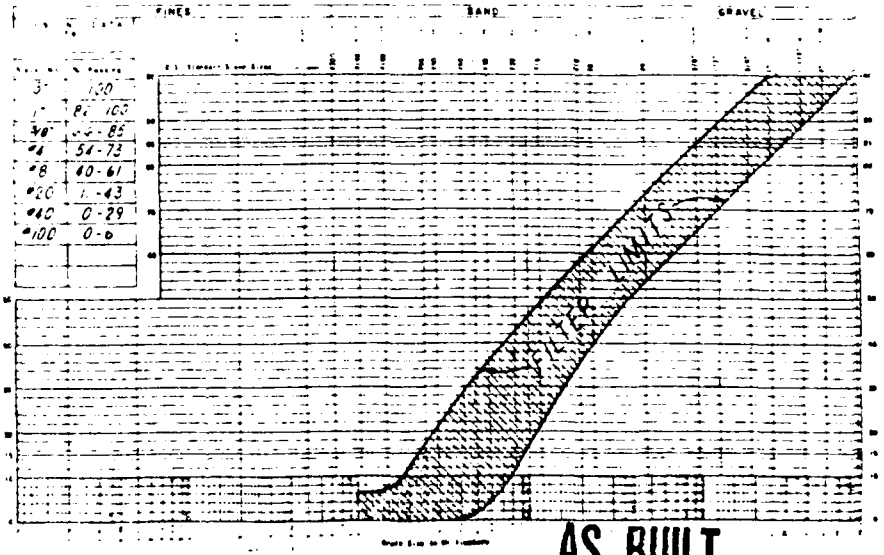
SECTION D-D



PROFILE OF INTERCEPTOR DRAIN NO 2



PROFILE OF INTERCEPTOR DRAIN NO 1



AS BUILT

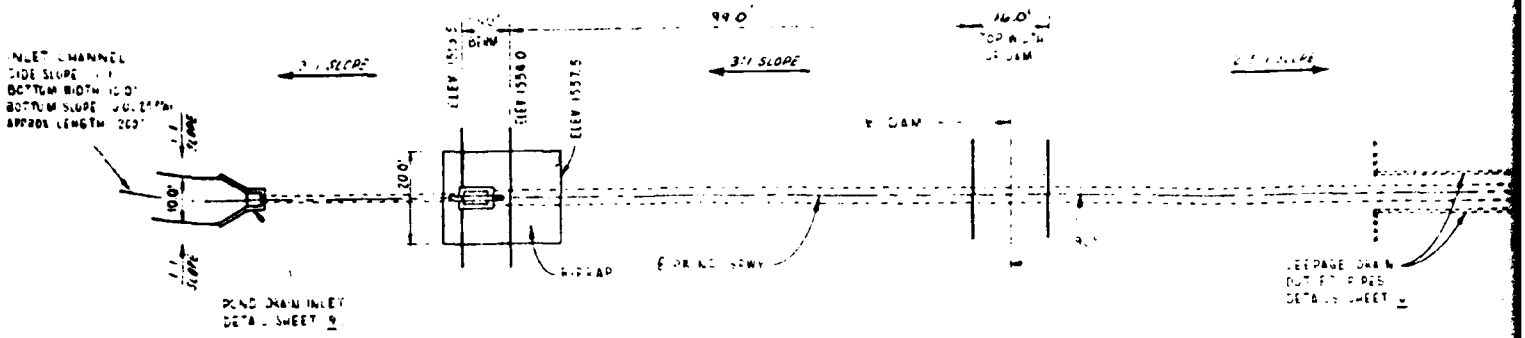
CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
SEEPAGE DRAIN DETAIL

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
J V RISZDORFER	MAY '63	Title
Drawn		
Traced		Title
Checked		Sheet No. 6 of 11 — Drawing No. NY - 849 - P

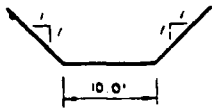
2+00 R

3+00 R

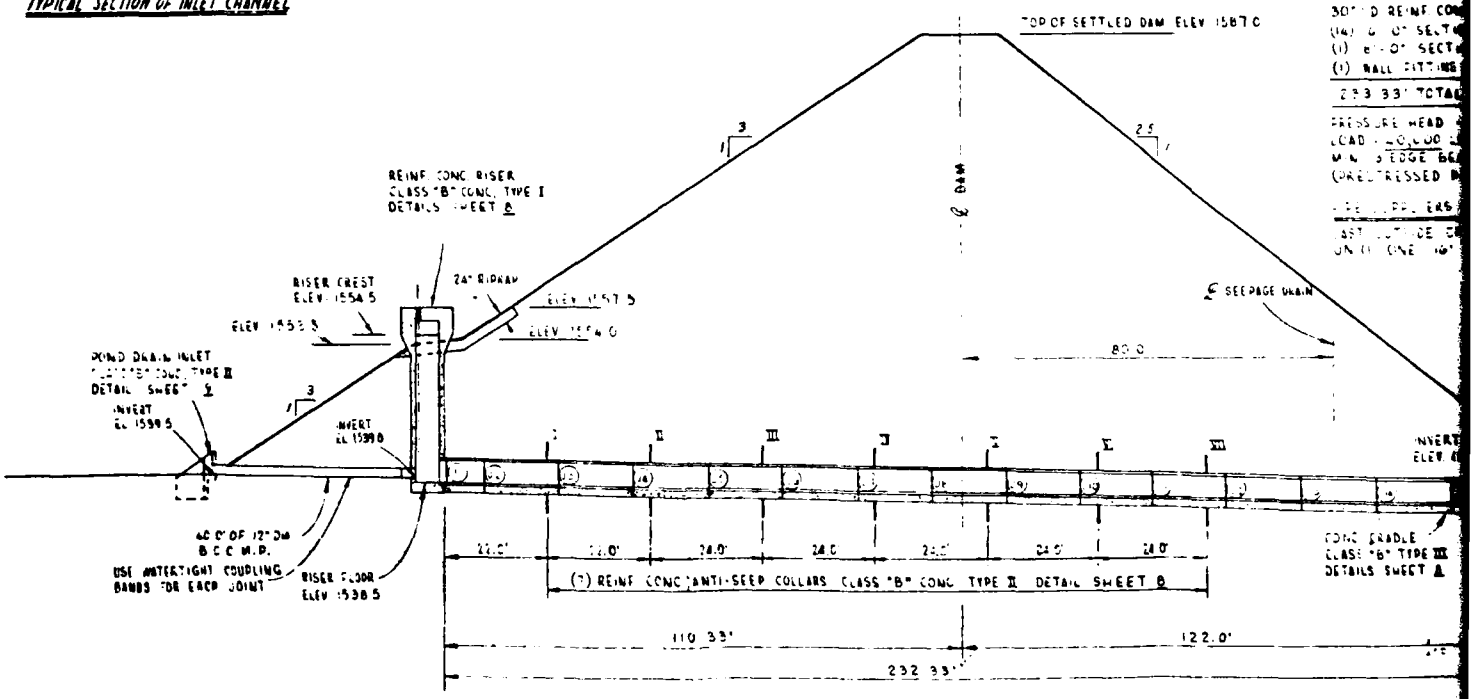


PLAN

SCALE



TYPICAL SECTION OF INLET CHANNEL



PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY

0 5 10 20 30 FEET

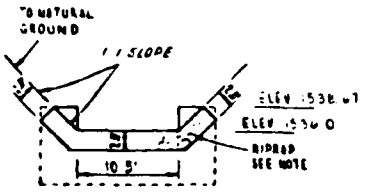
HORIZ SCALE

0 5 10 20 FEET

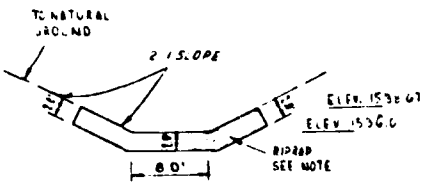
VERT SCALE

NOTE.

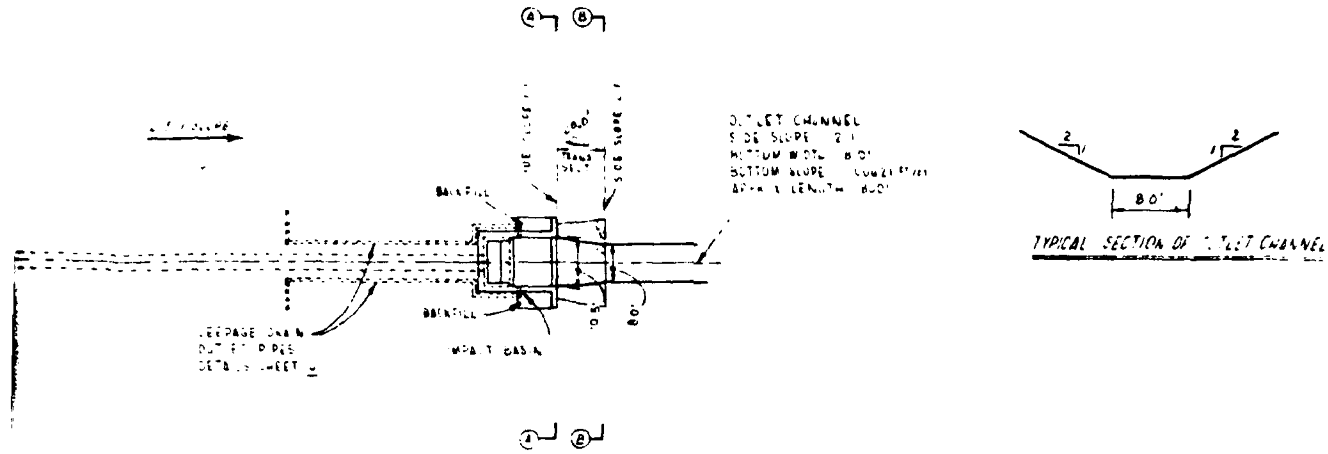
RIPRAP SHALL BE WELL GRADED FROM A MINIMUM SIZE OF 4" TO A MAXIMUM SIZE OF 24"

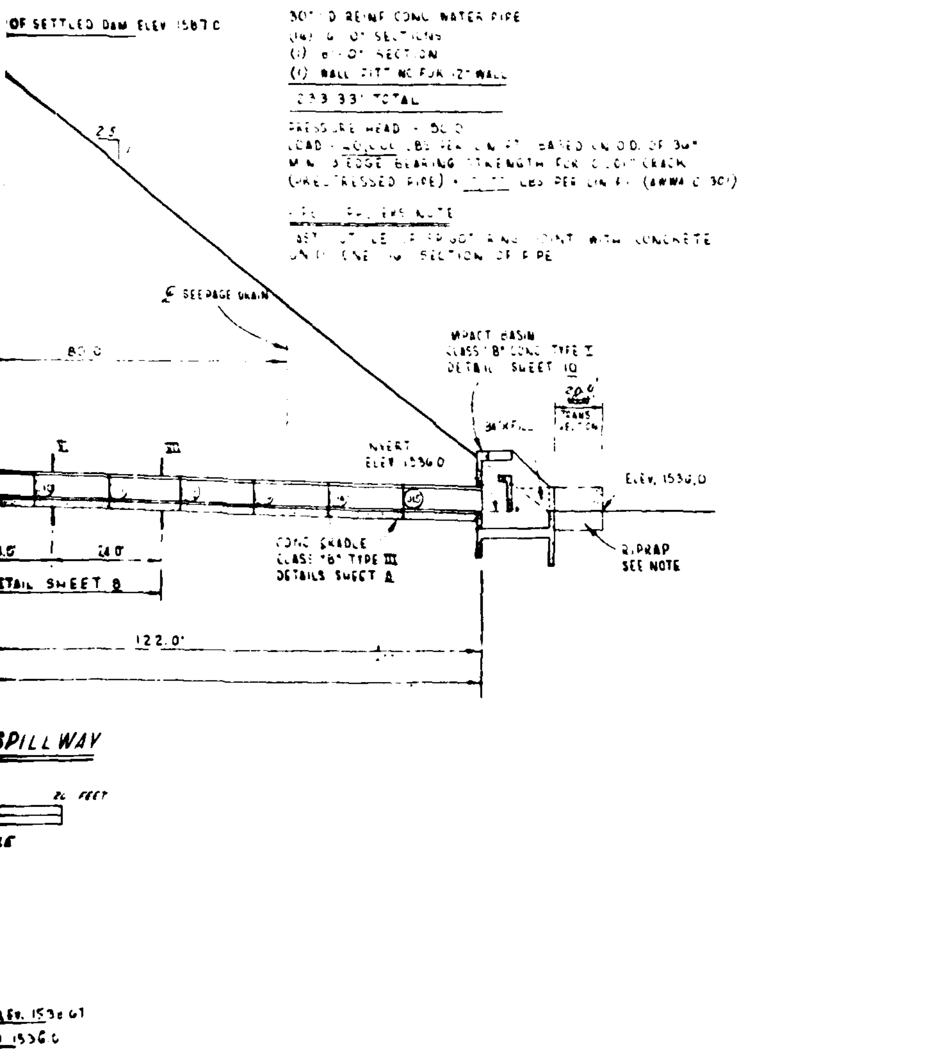


SECTION AA



SECTION BB





JOINT	DISTANCE FROM RISER WALL FITTING	INVERT ELEV OF 30" DIA PIPE	SLOPE
J1	0	1538.50	
J2	8	1538.44	SLOPE = 0.00767
J3	24	1538.31	
J4	40	1538.19	
J5	56	1538.07	
J6	72	1537.95	
J7	88	1537.82	
J8	104	1537.70	
J9	120	1537.49	SLOPE = 0.01328
J10	136	1537.29	
J11	152	1537.06	
J12	168	1536.85	
J13	184	1536.64	
J14	200	1536.43	
J15	216	1536.21	
OUTLET	232	1536.00	

NOTE.

ABOVE DIMENSIONS FOR LENGTHS OF PIPE ARE NOMINAL & DO NOT INCLUDE CREEP.

COLLAR	DISTANCE FROM RISER WALL	INVERT ELEV. OF 30" DIA. PIPE
I	2[illegible]	1538.3[illegible]
II	44	1538.[illegible]
III	68	1537.[illegible]
IV	9[illegible]	1537.[illegible]
V	116	1537.55
VI	140	1537.[illegible]
VII	164	1536.91

AS BUILT

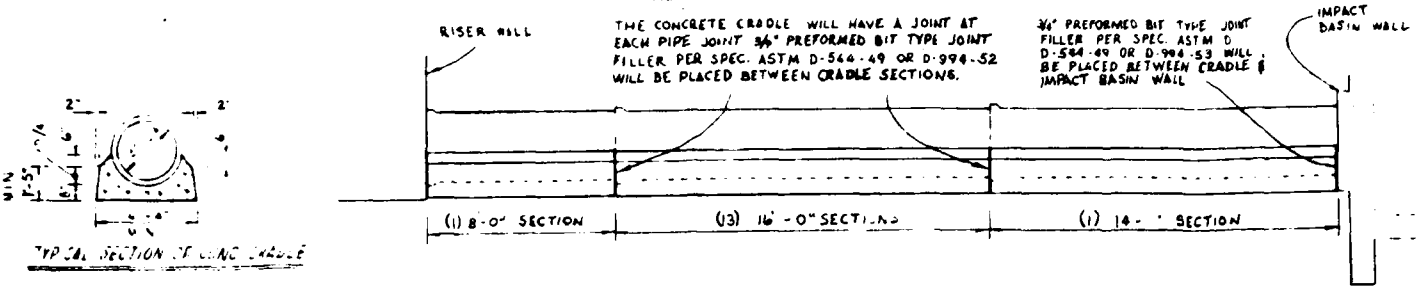
CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO. 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
PLAN – PROFILE OF PRINCIPAL SPILLWAY

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: J.V. BISDORFER — Date: May '63	Approved by
Drawn	Title
Traced	Title
Checked: E.M. WYBORA — May '63	Sheet 7 of 11 — Drawing No. NY-849

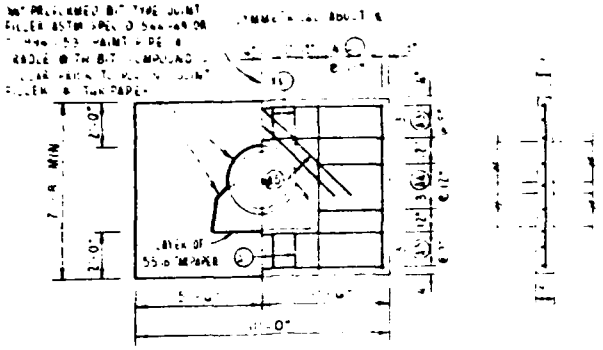
B-8

THRU

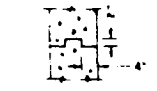


TYPICAL SECTION OF CONC CRADLE

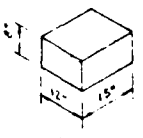
CONCRETE CRADLE DETAILS



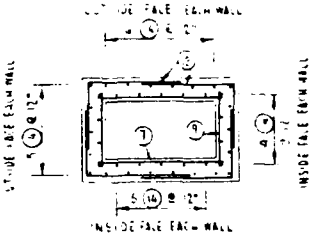
DETAILS OF REINFORCED CONCRETE ANTI-SEEP COLLAR



TYP CONST JOINT

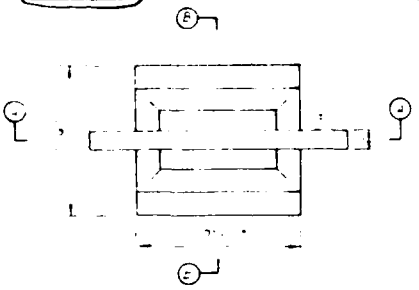


SUGGESTED CONC SUPPORT BLOCK

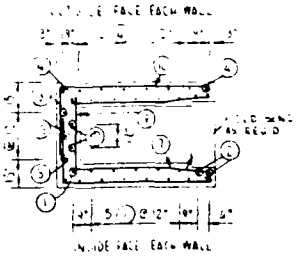


SECTION DD

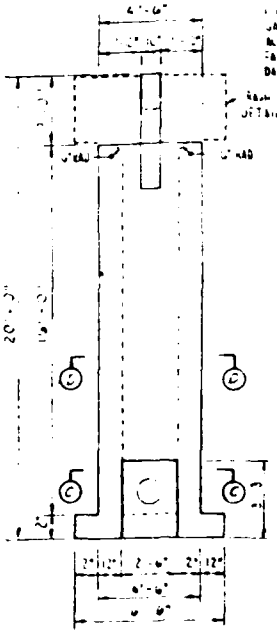
SLUICE GATE NOTES:



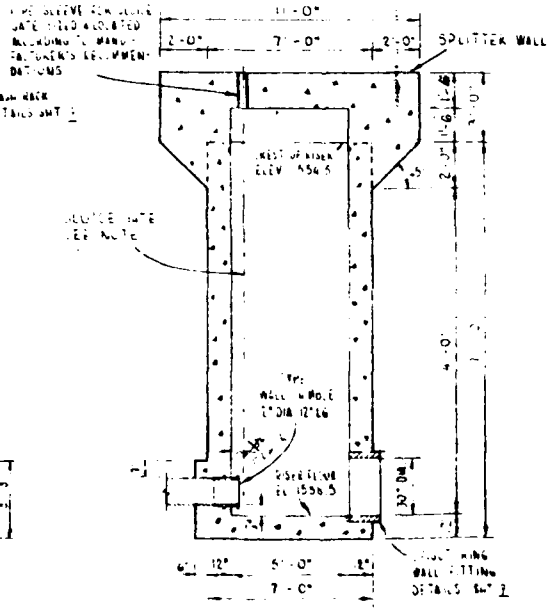
PLAN



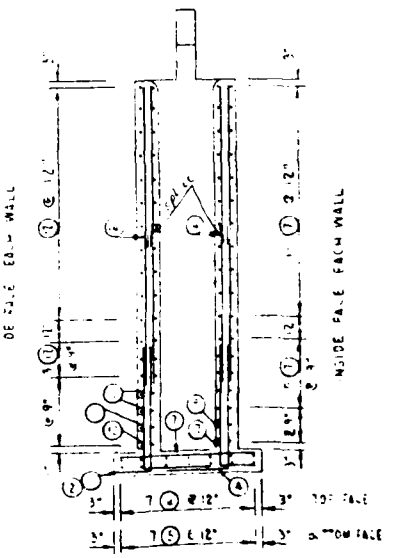
SECTION CC



CENTERLINE ELEV

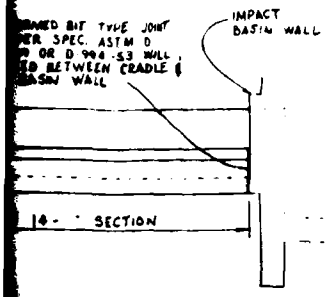


SECTION ALONG CENTERLINE



SECTION EE

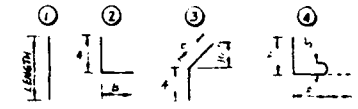
REINFORCED CONCRETE RISER DETAILS



STEEL SCHEDULE

MARK	LOCATION	QUAN	SIZE	LENGTH	TYPE	A	B	C	TOTAL ft
1	RISER	12	6	6-10	2	5-6	1-6		80.00
2		4	6	6-7	2	5-6	1-5		26.33
3		2	6	7-6	2	5-6	2-0		14.67
4		13	6	8-6	4	5-6	3-0		133.33
5		9	6	6-6	1				49.50
6		7	5	6-6	1				42.50
7		41	5	6-0	1				246.00
8		2	5	6-6	2	5-9	3-4		12.00
9		31	5	3-6	1				108.50
10		6	5	9-11	4	2-10	6-6	6-7	69.50
11		2	5	8-4	4	1-9	6-6	6-7	16.67
12		56	5	6-11	2	4-11	2-10		387.33
13		3	6	2-6	1				7.50
14		40	5	13-9	1				552.50
15	SPLITTER WALL	2	5	5-1	2	1-7	3-6		10.17
16		2	5	2-2	1				4.33
17		2	5	2-6	1				5.00
18		2	5	10-6	1				21.00
19		2	5	3-0	1				6.00
20		4	5	4-0	1				16.00
21		5	9	1-0	1				5.00
A1	COLLAR	34	6	1-6	1				102.00
A2		6	6	7-7	1				522.00
A3		6	6	9-7	1				697.00
A4		34	6	3-0	1				306.00
A5		24	6	6-6	1				198.00

BAR TYPES

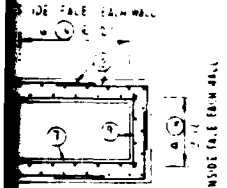


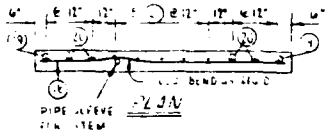
STEEL QUAN.
(THIS SHEET ONLY)

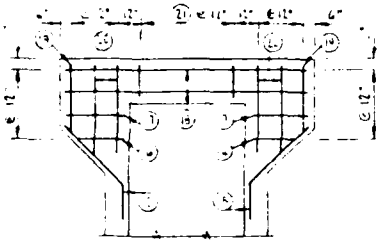
N° 4 BARS	1025 LIN FT	1010.5 LBS
N° 5 BARS	1442 LIN FT	1536.4 LBS
N° 6 BARS	236 LIN FT	356.3 LBS
TOTAL		2903.2 LBS

CONCRETE QUAN.
(THIS SHEET ONLY)

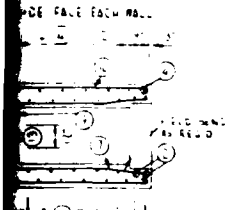
CLASS 'B' TYPE I	13.7	CU YDS
CLASS 'B' TYPE II	14.7	CU YDS
CLASS 'B' TYPE III	41.7	CU YDS



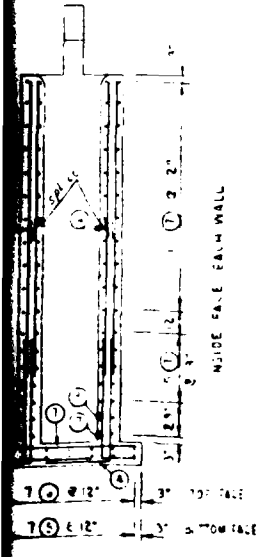




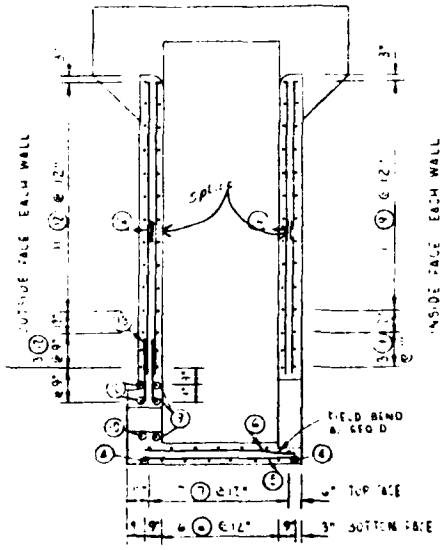
SPLITTER WALL STEEL DETAILS



SECTION CC



SECTION BB



SECTION AA

DETAILS

0 1 2 3 4 5 6 Feet
SCALE

GENERAL NOTES:

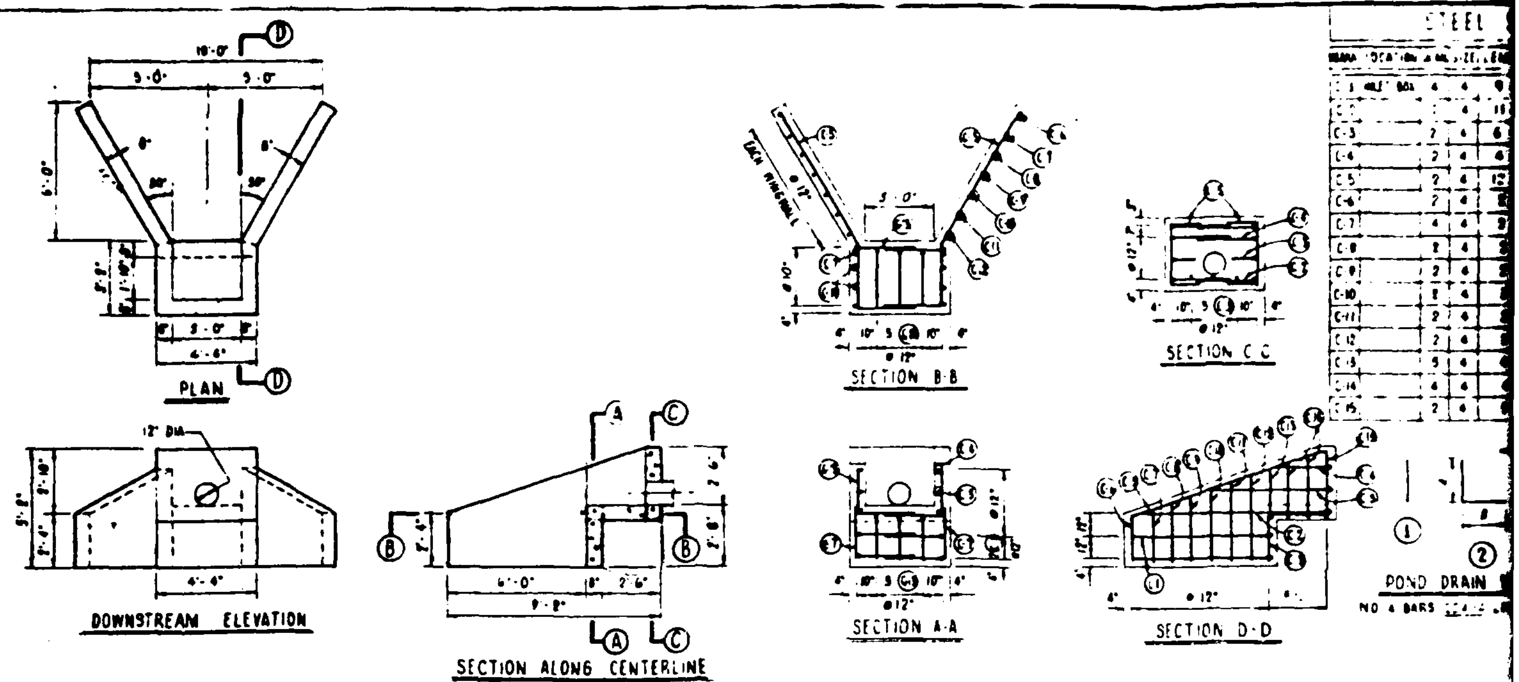
1. ALL CONCRETE SHALL BE CLASS "B" OR OF THE TYPE NOTED.
2. PORTLAND CEMENT TYPE IA OR TYPE I WITH AN AIR ENTRAINING ADMIXTURE SHALL BE USED.
3. ALL REINFORCING STEEL PLACED IN CONCRETE POURED AGAINST THE GROUND SHALL HAVE A MIN. OF 3" CLEAR COVER WHERE FORMS ARE USED ALL BARS SHALL HAVE A MIN. OF 2" CLEAR COVER.
4. ALL REINFORCING STEEL TO BE LAPPED A MIN. OF 40 BAR DIA.
5. ALL EXPOSED EDGES OF CONCRETE TO HAVE A ¾" CHAMFER UNLESS OTHERWISE NOTED.

AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO. 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
RISER - CRADLE - COLLAR DETAILS

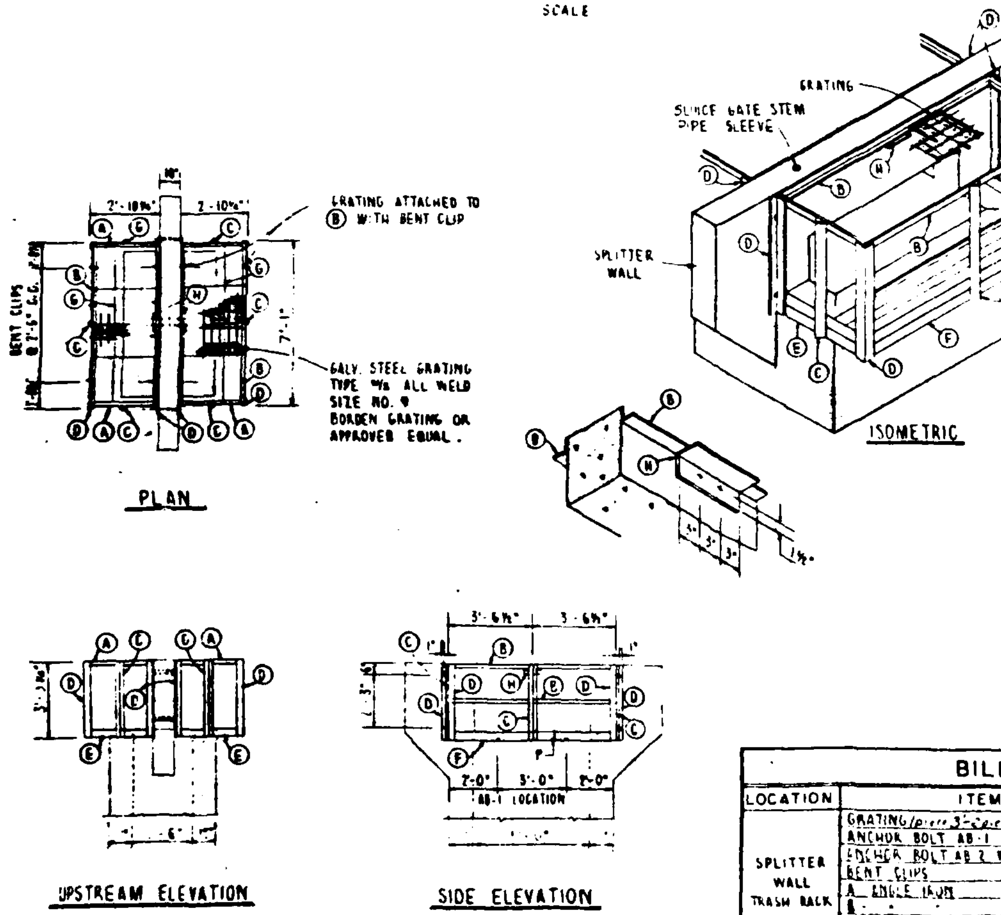
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
J.V. BISDORFER	May '63	Title
Drawn		Title
Traced		Title
Checked		Sheet No. 8 of 11
F.M. WYRONG	May '63	Drawing No. NY-849-P



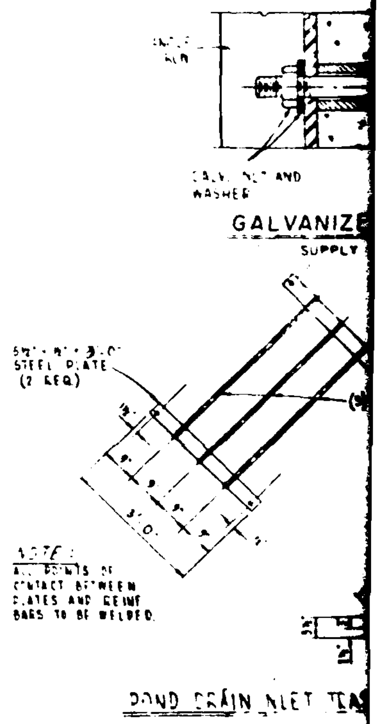
DETAILS OF REINFORCED CONCRETE POND DRAIN INLET BOX

SCALE



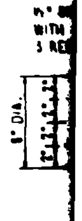
SPLITTER WALL TRASH RACK DETAILS

SCALE



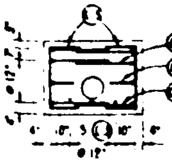
POND DRAIN INLET TRA

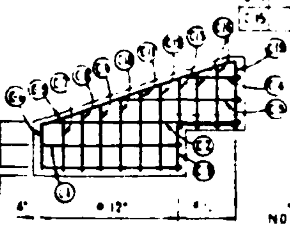
BILL OF MATERIAL				
LOCATION	ITEM	SIZE	LENGTH	QUANTITY
SPLITTER WALL TRASH RACK	GRATING (piece 3' - 2 pieces 2' = 7'	NO. 9	2' 9½" x 7' 0"	2
	ANCHOR BOLT AB-1	½" DIA	2' x 8"	4
	ANCHOR BOLT AB 2 W/ 10" LG SLEEVE	[illegible] DIA.	1' 0"	6
	BENT CLIPS	-	-	16
	A ANGLE IRON	[illegible]	2' 10"	4
	B " "	[illegible]	[illegible]	6
	C " "	[illegible]	3' [illegible]	6
	D " "	3" x 3" x [illegible]	3' [illegible]	8
	E " "	4" x 4" x [illegible]	2' 10"	4
	F " "	4" x 4" x [illegible]	7' 0½"	2
	G " "	4" x 4" x [illegible]	6' 4½"	2
	H " "	3" x 3" x [illegible]	0' 9"	2
POND DRAIN INLET	STEEL PLATE	[illegible]	[illegible]	
	[illegible] REINF BARS	[illegible]	4' 6[illegible]	5



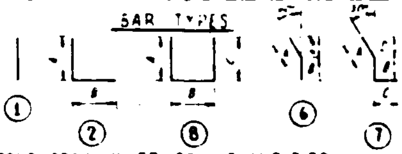
STEEL SCHEDULE

MARK	LOCATION	NO.	SIZE	LENGTH	TYPE	A	B	C	TOTAL FT.
C-1	INLET BOX	4	4	9-6	6	6-11	2-6		37.67
C-2		[illegible]	4	11-7	7	6-7	2-6	[illegible]	23.17
C-3		2	4	6-11	7	3-5	2-6	[illegible]	13.83
C-4		2	4	4-10	2	2-4	2-6		9.67
C-5		2	4	12-[illegible]	7	7-2	2-[illegible]	[illegible]	[illegible]
C-6		2	4	2-0	1				4.00
C-7		4	4	2-3	1				9.00
C-8		2	4	2-6	1				5.00
C-9		2	4	2-9	1				5.50
C-10		2	4	3-0	1				6.00
C-11		2	4	3-3	1				6.50
C-12		2	4	3-6	1				7.00
C-13		5	4	4-6	2	2-0	2-6		22.50
C-14		4	4	4-9	2	2-3	2-6		19.00
C-15		2	4	5-3	8	1-3	2-9	[illegible]-3	10.50


SECTION C-C

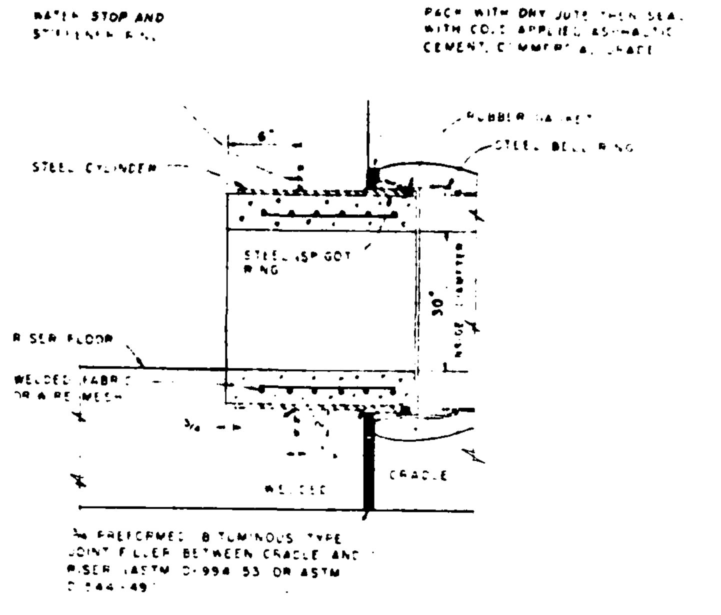

SECTION D-D

BAR TYPES

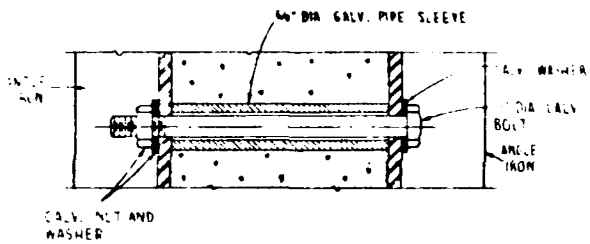


POND DRAIN INLET BOX QUANTITIES

NO. 4 BARS 224.[illegible] LIN. FT. ____ LBS. CLASS "B" TYPE B 22.[illegible]

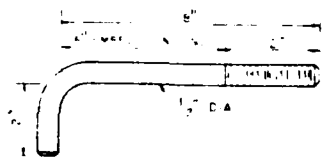


SPIGOT RING WALL FITTING



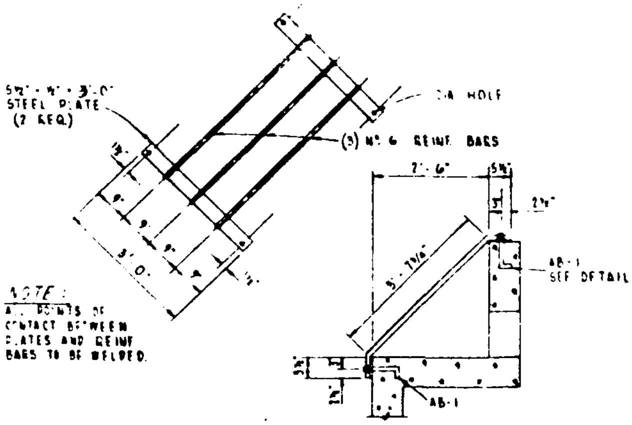
GALVANIZED ANCHOR BOLT AB-2

SUPPLY WITH NUT AND WASHER

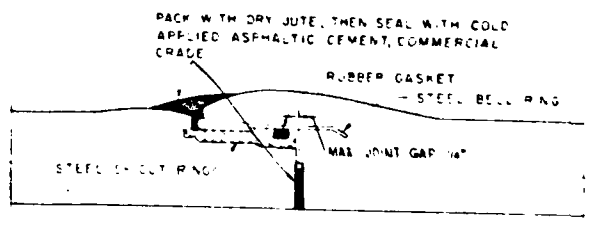


STAINLESS STEEL ANCHOR BOLT, AB-1

SUPPLY WITH NUT AND WASHER



POND DRAIN INLET TRASH RACK DETAILS

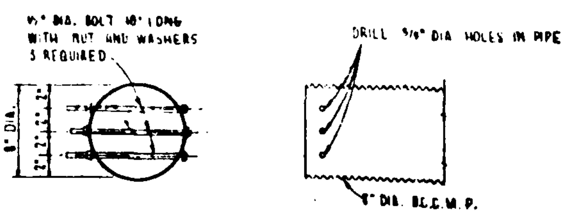


DETAIL OF REINFORCED CONCRETE WATER PIPE JOINT

AS BUILT

MATERIAL

	SIZE	LENGTH	QUANTITY
	NO. 9	2'-9½" x 7'-0"	2
	½" DIA	2'-8"	4
[illegible]	[illegible] DIA	1'-0"	6
			16
	[illegible]	2'-10"	4
	[illegible]	[illegible]	6
	[illegible]	[illegible]	6
	[illegible]	[illegible]	1
	4" x 4" x [illegible]	2'-10"	4
	[illegible]	[illegible]	2
	[illegible]	[illegible]	2
	[illegible]	0'-9"	2
	[illegible]	[illegible]	
	[illegible]	4'-6[illegible]	3



DETAIL OF SMALL ANIMAL GUARD

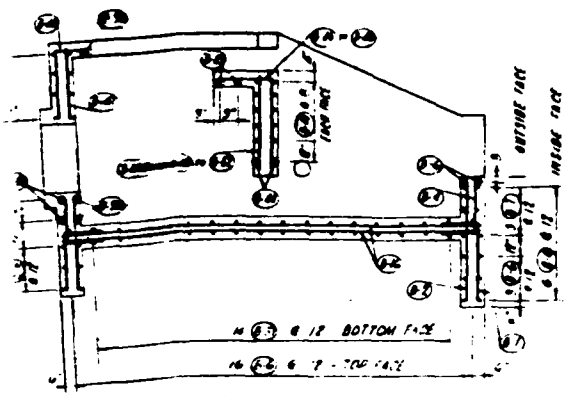
[illegible] REQUIRED

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
TRASH RACK - POND DRAIN INLET & MISC. DETAILS

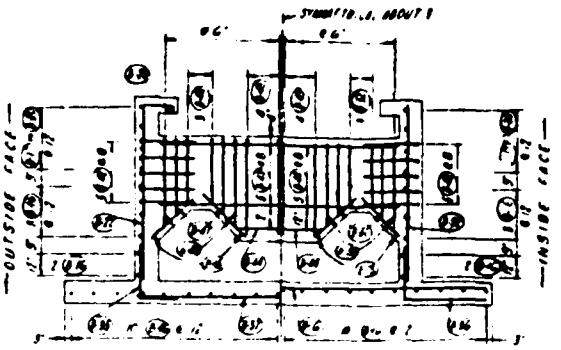
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
J.V. RISDORFER	May '63	
Drawn		
Traced		
Checked		Sheet 9 of 11 — Drawing No. NY-849
F.M. WYSONG	May '63	

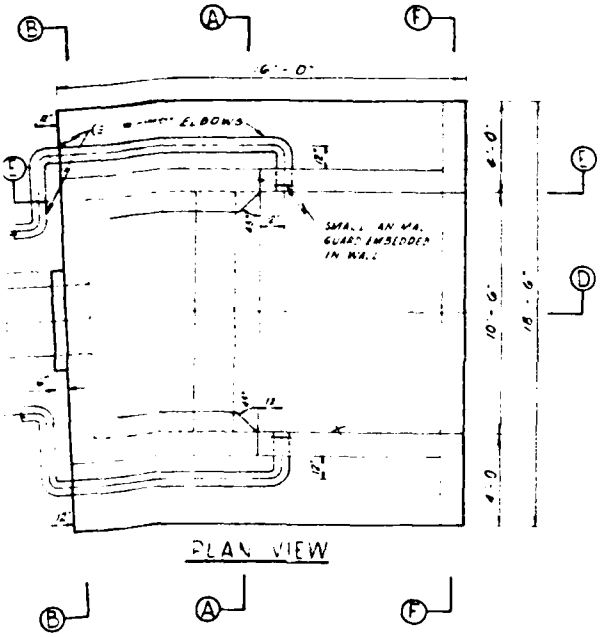
B-10



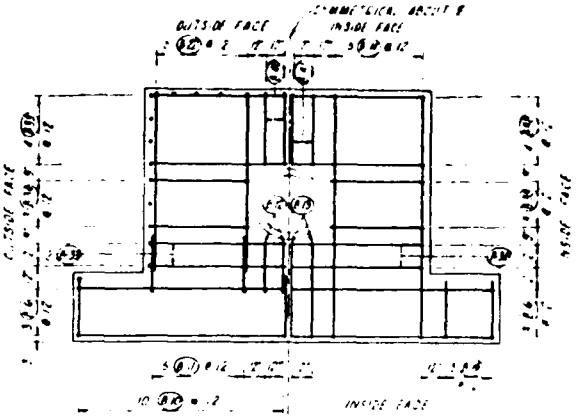
SECTION D-D



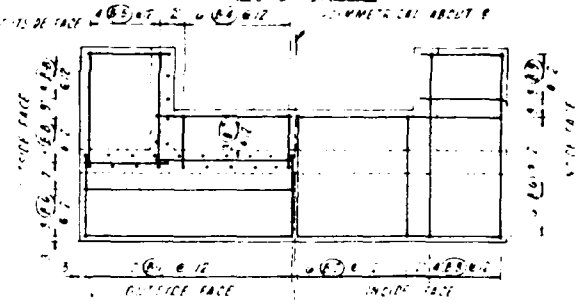
SECTION A-A



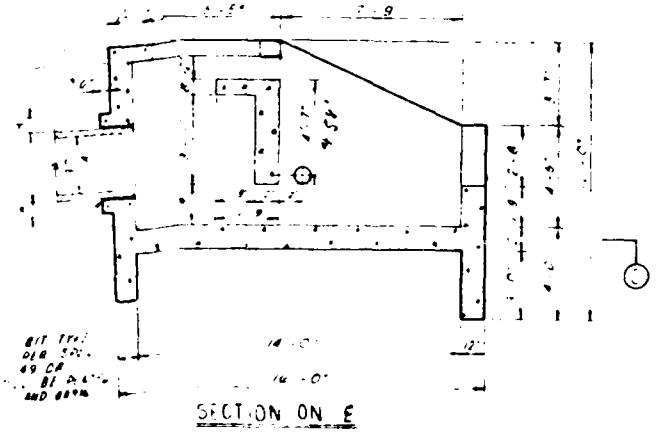
PLAN VIEW



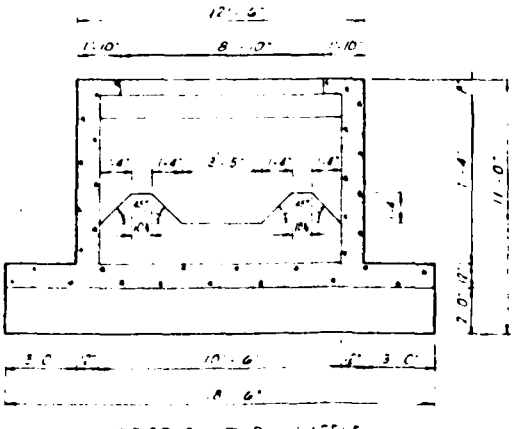
SECTION B-B



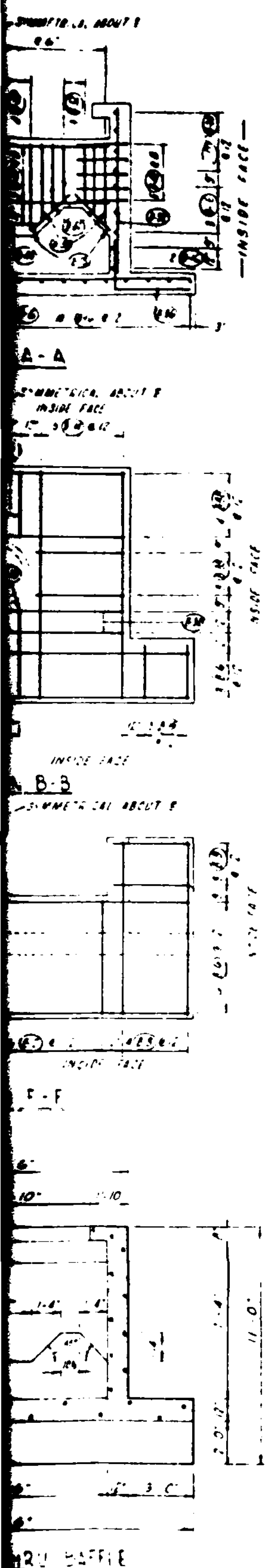
SECTION E-E

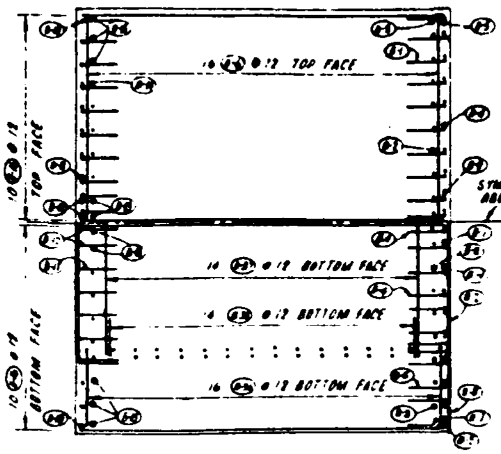


SECTION ON E

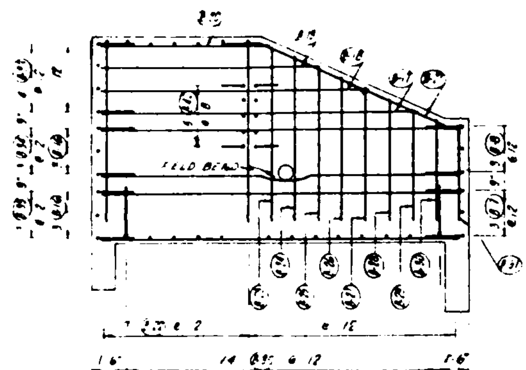


SECTION THRU BAFFLE

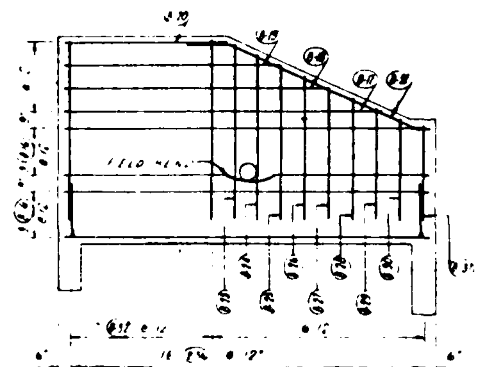




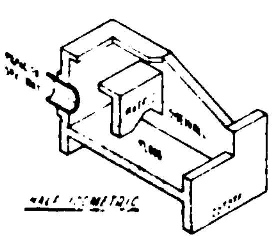
SECTION C-C



SECTION E-E
OUTSIDE FACE



SECTION E-E
INSIDE FACE



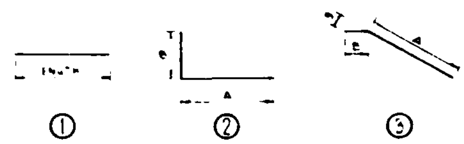
HALF ISOMETRIC

NOTE:
SEE SHEET 8 FOR GENERAL NOTES

STEEL SCHEDULE

MARK	LOCATION	QUAN.	SIZE	LENGTH	TYPE	A	B	C	TOTAL FT.
B 1	CUTOFF DNSTM	10	5	5-2	2	3-7	1-7		38.17
B 2		11	5	6-3	1				57.75
B 3		8	5	8-0	1				64.00
B 4		11	5	3-11	2	2-4	1-7		43.08
B 5		8	5	6-7	2	5-0	1-7		52.67
B 6		33	5	18-0	1				594.00
B 7		6	5	8-5	2	6-10	1-7		50.50
B 8		12	5	5-2	2	3-7	1-7		62.00
B 9		6	5	3-6	1				21.00
B 10	CUTOFF UPSTM	19	5	4-2	2	2-7	1-7		79.17
B 11		10	5	3-11	2	2-4	1-7		39.17
B 12		3	5	3-7	2	2-0	1-7		10.75
B 13		3	5	4-3	1				12.75
B 14		10	5	10-6	1				106.00
B 15		4	5	8-6	1				34.00
B 16	SIDEWALLS	58	5	15-6	1				899.00
B 17		4	5	13-6	1				54.00
B 18		4	5	11-6	1				46.00
B 19		4	5	9-3	1				37.00
B 20		6	5	7-3	1				43.50
B 21		4	5	10-7	3	9-0	1-7		42.33
B 22		24	5	9-0	3	7-7	1-5		216.00
B 23		4	5	7-6	1				30.00
B 24		4	5	7-0					28.00
B 25		4	5	6-8	1				26.67
B 26		4	5	6-[illegible]					24.67
B 27		4	5	5-9	1				23.00
B 28		4	5	[illegible]	1				21.00
B 29		4	5	4-[illegible]	1				19.00
B 30		4	5	[illegible]	1				17.33
B 31		4	5	4-1					16.33
B 32		14	5	7-9	1				108.50
B 33	SIDE & BACK WL	14	5	8-4	2	6-9	1-7		116.67
B 34	BACKWALL	6	5	3-11	2	4-4	1-7		55.50
B 35	SIDEWALL & FLR	[illegible]	5	4-0	2	[illegible]	1-7		112.00
B 36		32	5	6-0	2	2-5	3-7		192.00
B 37	FLOOR	4	5	2-3	1				[illegible]
B 38	BACKWALL	7	5	2-0	1				84.00
B 39		6	5	4-6	1				[illegible]
B 40		[illegible]	5	4-[illegible]	2	3-2	1-[illegible]		[illegible]
B 41		3	5	3-2	1				9.50
B 42	BAFFLE	20	5	3-5	2	1-0	2-5		68.33
B 43		12	5	[illegible]-6	1				126.00
B 44		2	5	4-0	1				8.00
B 45		7	5	6-7	2	4-3	2-4		[illegible]
B 46		4	5	6-[illegible]	2	3-9	2-4		24.33
B 47		4	5	5-4	2	3-0	[illegible]-4		21.33
B 48		[illegible]	5	5-2	2	[illegible]	2-4		31.00
B 49		7	5	2-9	1				19.[illegible]
B 50		4	5	3-9	1				15.00
B 51		4	5	3-0	1				12.00
B 52		[illegible]	5	2-10	1				17.00

BAR TYPES



QUANTITIES

CONCRETE:
CLASS B TYPE I
30.0 CU YDS

REINF. STEEL:
No 5 BAR 4136.08 LIN FT
4313.9 LBS

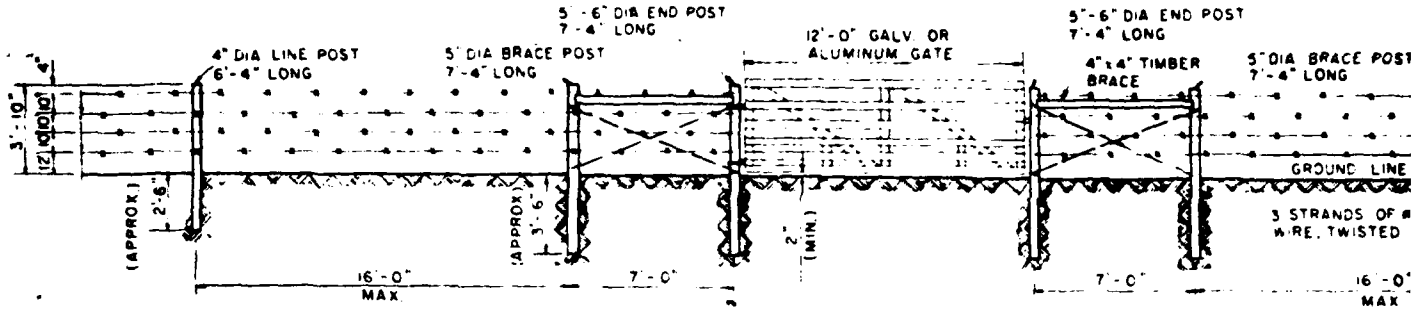
AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO. 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
IMPACT BASIN DETAILS

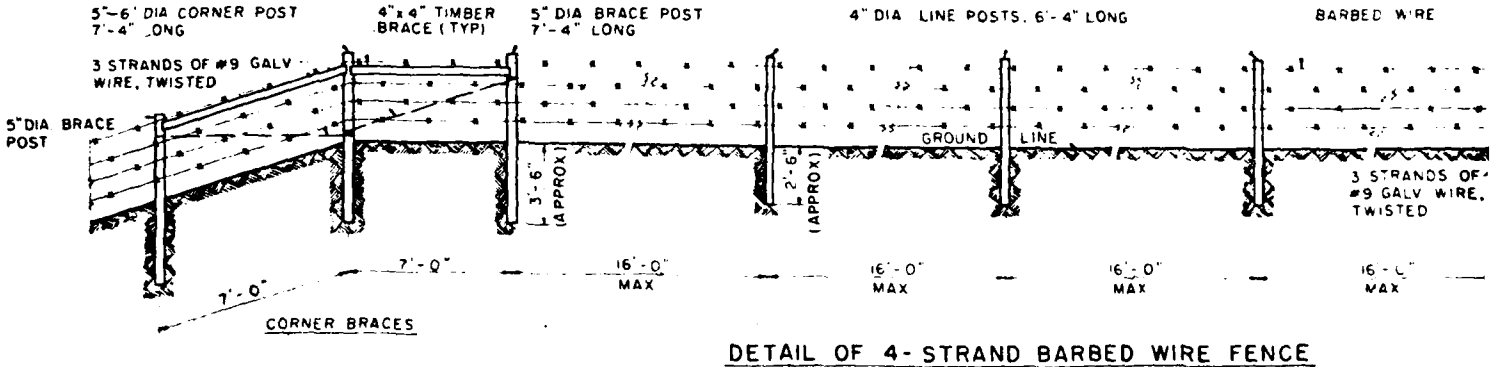
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: J.V. BISDORFER	Date: May '63	Approved by
Drawn		Title
Traced		Title
Checked: F.M. WYSONG	May '63	Sheet No. 10 of 11 — Drawing No. NY-849-P

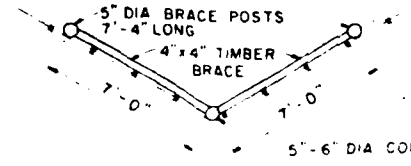
PLAN VIEW



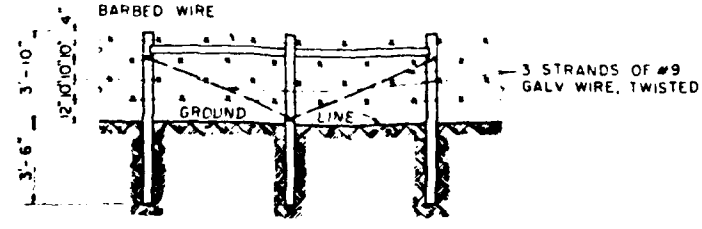
TYPICAL GATE SECTION



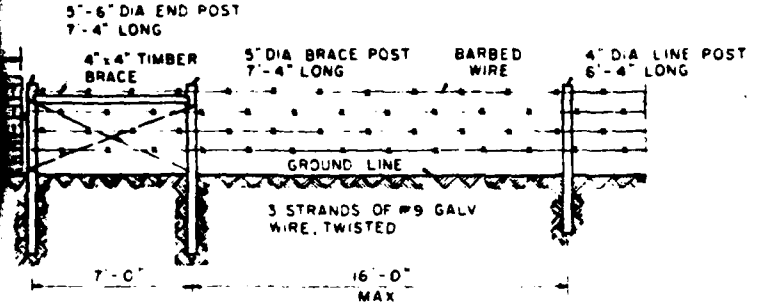
DETAIL OF 4-STRAND BARBED WIRE FENCE



PLAN VIEW



TYPICAL CORNER AND DIRECTION CHANGE BRACING



NOTES.

1 ALL POSTS AND BRACES PRESSURE TREATED WITH CREOSOTE

2 BRACE POSTS, MAXIMUM SPACING 7'-0" CENTER TO CENTER

3 LINE POSTS MAXIMUM SPACING 16'-0" CENTER TO CENTER

4 STEEL POSTS MAY BE SUBSTITUTED FOR LINE POSTS

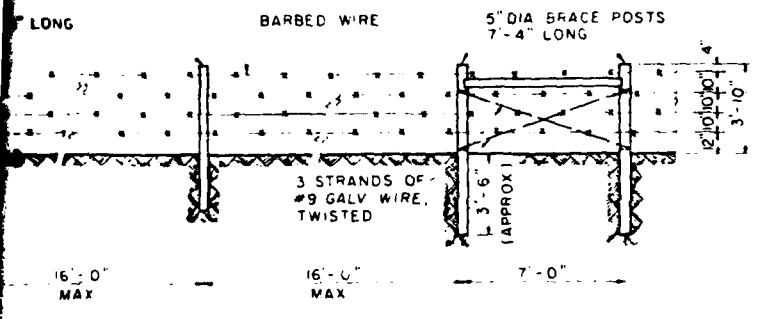
5 NOTCH POSTS 3/4" FOR TIMBER BRACE

6 THE TOPS OF ALL POSTS TO BE SAWED OFF 4" ABOVE TOP WIRE

7 ALL BARBED WIRE SHALL BE 12½ GAGE, BARBS SHALL HAVE 4 POINTS AT 5 INCH SPACING

8 STAPLE WITH STAPLES HAVING HOOKED ENDS OR BARBS

ION



LINE BRACES

RBED WIRE FENCE

LONG

#9
ISTED

AS BUILT

CONEWANGO CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 16
ELM CREEK
CATTARAUGUS COUNTY, NEW YORK
FENCING DETAILS
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Wm A ALLABAND
W H MORGAN
C B FORD
NORMAN W WILSON

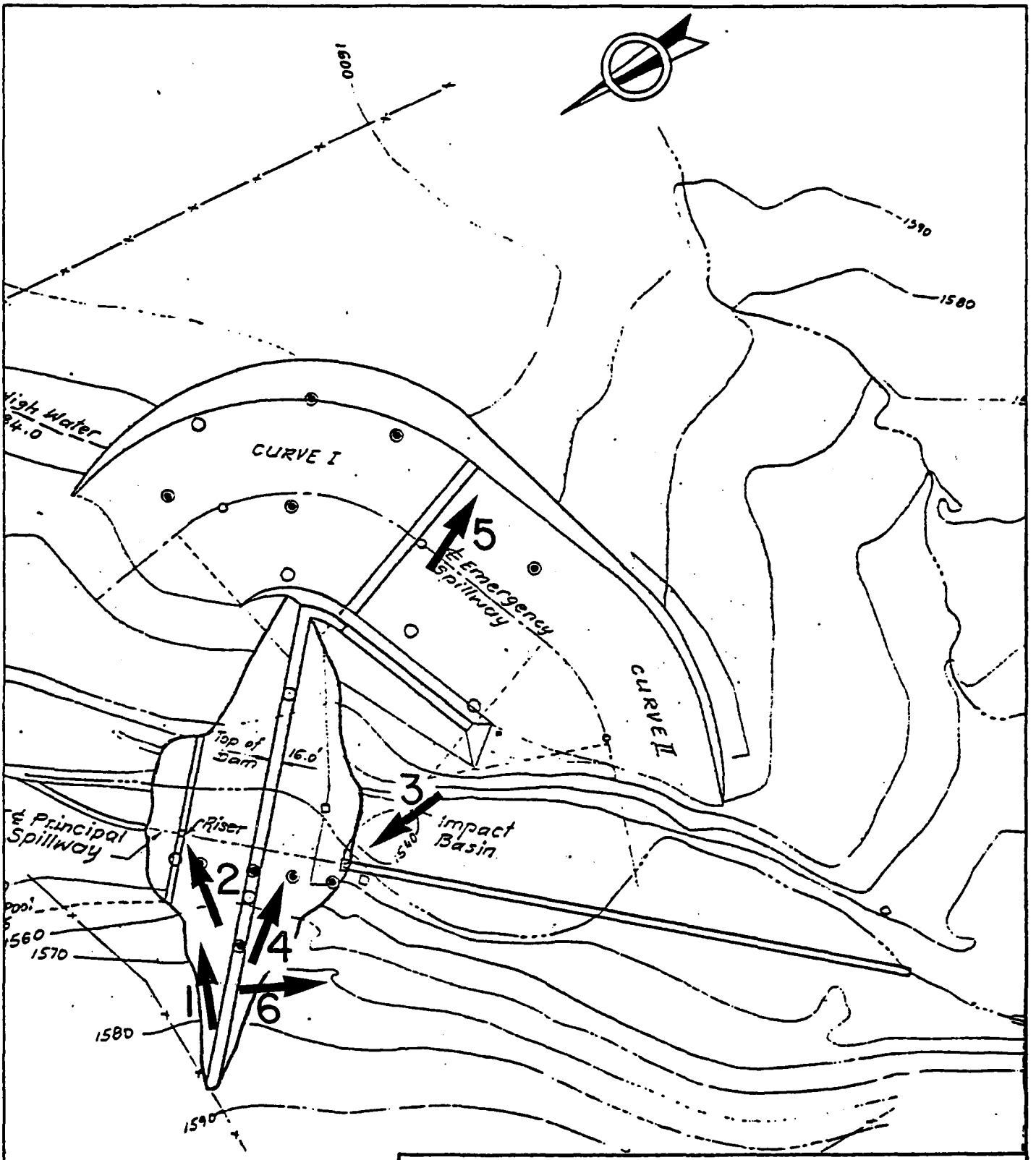
NY-849-1

B-12

2

APPENDIX C

PHOTOGRAPHS



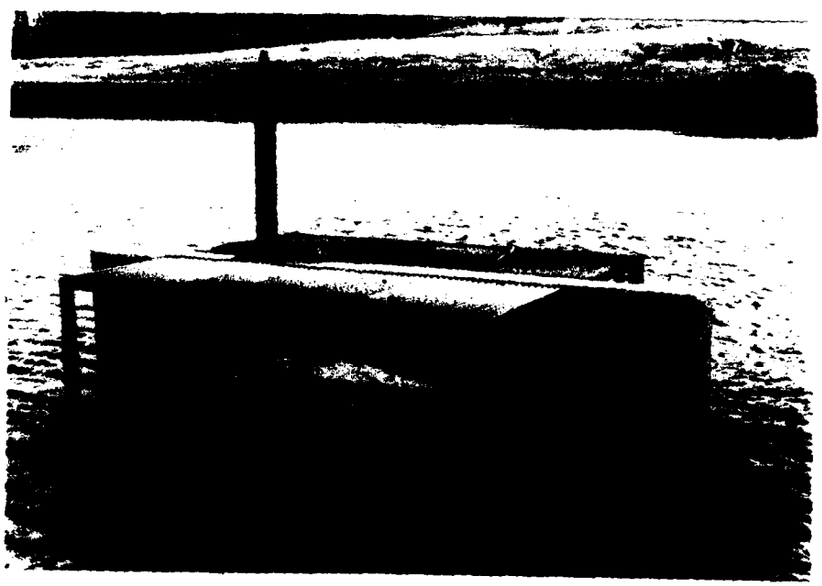
ELM CREEK DAM (DAM No. 16)

NY00593

PHOTO ORIENTATION PLAN

ENDMAN, ANTHONY, ASSOCIATES CONSULTING ENGINEERS & PLANNERS	DATE MAY 1981	C-1

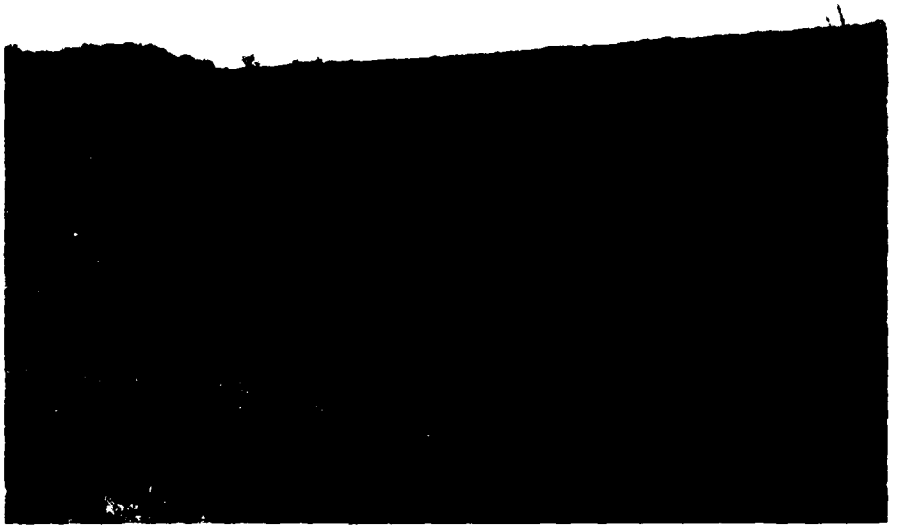
1. Principal spillway inlet structure and impoundment



2. Principal spillway high stage inlet structure showing trash rack

3. Principal spillway impact basin

4. Slope erosion along west side of emergency spillway embankment



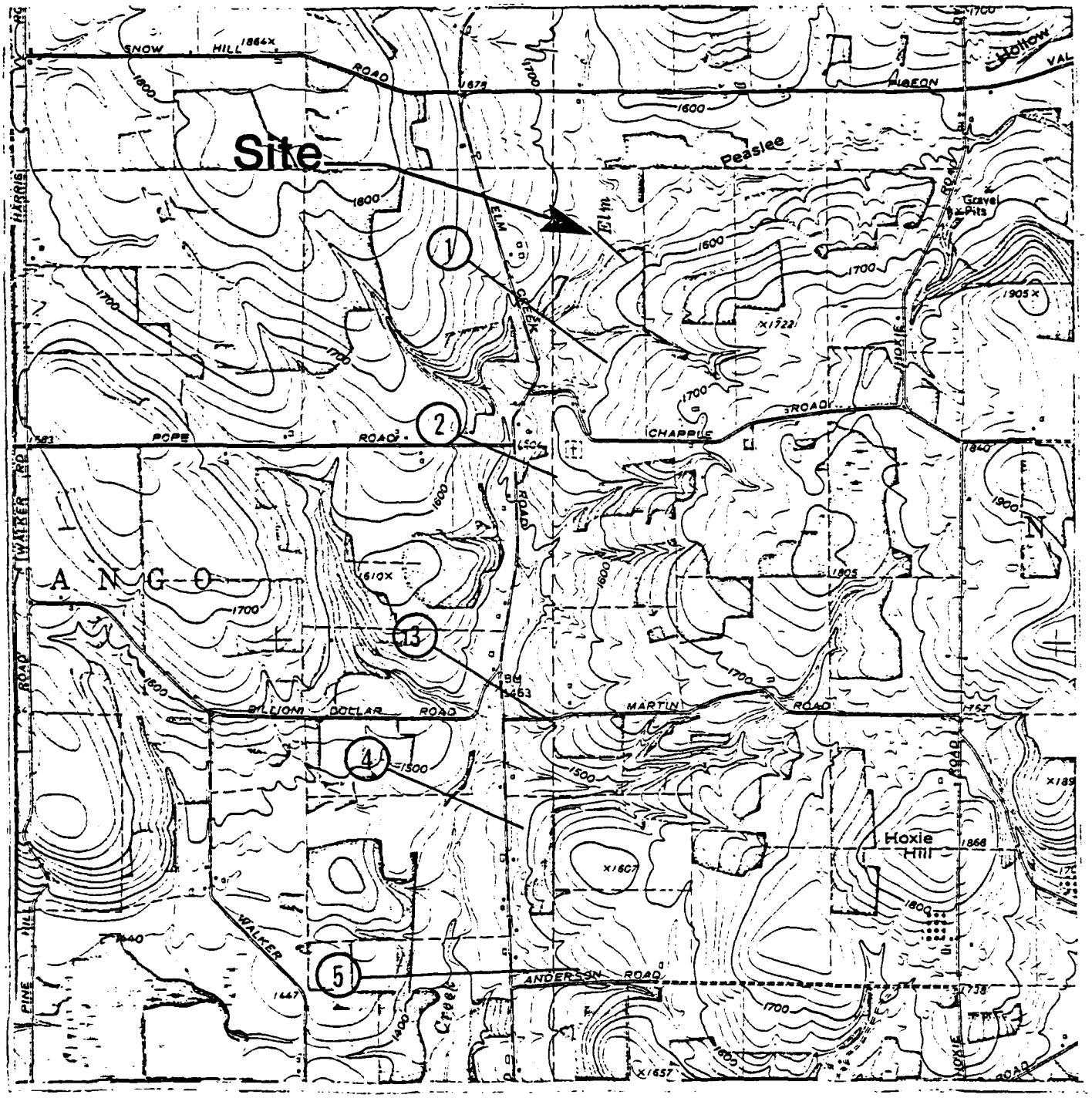
5. Slope erosion along west side of south emergency spillway embankment

6. Berm at downstream north abutment. Note ponded water.

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

APPENDIX D



Elm Creek Dam (Dam No 16)

CROSS SECTION LOCATION PLAN

Scale: 1"=2000'

D-2

```
A1       ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF              DAM NY 593
A2       HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF ELM CREEK DAM
A3       RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM
B    100    .  0     15                                  0      -1       4
B1     5
J      1      6      1
J1   0.2    0.4    0.5    0.6    0.8    1.0
K      0  INFLOW                    0      0             1
K1       CALCULATION OF INFLOW HYDROGRAPH TO RESERVOIR
M      1      1    8.9           6.0      0                              1
P      0   22.7    117    127    141    151
T                                              1.0    0.1                       0
W   3.87   0.63
X    2.0   -.10    2.0
K      1 OUTFLOW                                         1
K1      CALCULATION OF OUTFLOW HYDROGRAPH FROM RESERVOIR
Y                                 1      1
Y1     1                                   -1554.5     -1
Y41554.5   1560   1570   1576   1578   1580   1581   1582   1583   1584
Y4  1585   1586   1587   1588   1589   1590
Y5     0     53     58    104    109   2592   4699   7219  10044  13249
Y5 16770  20590  24698  29084  33740  38777
$A    18  38.19 114.88    143 185.24  281.8
$E1554.5   1560   1579   1576   1580   1590
$$ 1578.
$D  1587    2.7    1.5    720
K      1      1                                  1
K1     CHANNEL ROUTING -MOD PULS RESERVOIR - 1
Y                                 1      1
Y1     1
Y6  .045    .04   .045   1535   1650   1600 0.0006
Y7     0   1500    550   1560   1063   1539   1670   1535   1080   1535
Y7  1059   1539   1250   1560   1500   1600      1
K      1      2                                  1
K1     CHANNEL ROUTING -MOD PULS REACH 1-2
Y                                 1      1
Y1     1
Y6  .045    .04   .045   1495   1580   3600 0.0110
Y7     0   1580    300   1565  722.5   1590    745   1495    760   1495
Y7 777.5   1500   1266   1560   1300   1580
K      1      3                                  1
K1     CHANNEL ROUTING -MOD PULS REACH 2-3
Y                                 1      1
Y1     1
Y6  .045    .04   .045   1445   1500   3630 0.0139
Y7     0   1500    250   1460  409.5   1456    418   1445    438   1445
Y7 455.5   1450    880   1460    880   1500
K      1      4                                  1
K1     CHANNEL ROUTING -MOD PULS REACH 3-4
Y                                 1      1
Y1     1
Y6  .045    .04   .045   1426   1460   1100 0.0110
Y7     0   1460    450   1440    725   1421  742.5   1426  762.5   1426
Y7   780   1431   1010   1440   1300   1440
K      1      .                                  1
K1     CHANNEL ROUTING -MOD PULS REACH 4-5
Y                                 1      1
```

```
Y1        1
Y6    .045      .04      .045     1390      1450      2600    0.0140
Y7        0     1450       610     1420     872.5      1395       890      1390       910      1350
Y7    927.5     1395      1700     1420      2350      1450
K        99
```

```
OK. SEC EFFECTOP

OK. SEC EFFECTOR
ENTER PROJECT NUMBER
86156-03.CP
INPUT FILE ? MY553
1*********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 *********************************
1                               PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
                                     RUNOFF HYDROGRAPH AT        INFLOW
                                     ROUTE HYDROGRAPH TO         UTFLOW
                                     ROUTE HYDROGRAPH TO              1
                                     ROUTE HYDROGRAPH TO              2
                                     ROUTE HYDROGRAPH TO              3
                                     ROUTE HYDROGRAPH TO              4
                                     ROUTE HYDROGRAPH TO              5
                                     END OF NETWORK

 1*********************************
  FLOOD HYDROGRAPH PACKAGE (HEC-1)
  DAM SAFETY VERSION      JULY 1978
    LAST MODIFICATION  26 FEB 79
  *********************************

  RUN  DATE: 5/06/
       TIME: 3:19 PM

                   ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF            DAM NY 553
                   HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF ELM CREEK DAM
                   RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM

                                          JOB SPECIFICATION
               NO      NHR     NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
              100        0       15       0       0       0       0      -1       4       0
                                      JOPER     NWT   LROPT   TRACE
                                          5       0       0       0

                                    MULTI-PLAN ANALYSES TO BE PERFORMED
                                       NPLAN= 1 NRTIO= 6 LRTIO= 1
                 RTIOS=   0.20   0.40   0.50   0.60   0.80   1.00


     **********       **********       **********       **********       **********

                                       SUB-AREA RUNOFF COMPUTATION

                  CALCULATION OF INFLOW HYDROGRAPH TO RESERVOIR
                          ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                         INFLOW       0       0       0       0       0       1       0       0

                                            HYDROGRAPH DATA
               IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                   1       1    [illegible]    0.00    [illegible]    [illegible]   1.000       0       1       0
```

PRECIP DATA

SPFF	PMS	R6	R12	R24	R48	R72	R96
0.00	22.70	117.00	127.00	141.00	151.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.87 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= 2.00 QRCSN= -0.10 RTIOR= 2.00

UNIT HYDROGRAPH 85 END-OF-PERIOD ORDINATES, LAG= 3.85 HOURS, CP= 0.63 VOL= 1.00

14.	54.	110.	177.	251.	329.	412.	498.	584.	664.
731.	786.	827.	855.	869.	868.	845.	799.	745.	654.
647.	603.	562.	524.	488.	455.	424.	396.	369.	344.
320.	299.	278.	259.	242.	225.	210.	196.	182.	170.
158.	148.	138.	128.	120.	111.	104.	97.	90.	84.
78.	73.	68.	64.	59.	55.	51.	48.	45.	42.
39.	36.	34.	31.	29.	27.	25.	24.	22.	21.
19.	18.	17.	16.	14.	14.	13.	12.	11.	10.
10.	9.	8.	8.	7.					

END-OF-PERIOD FLOW

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	27.42	23.67	3.75	403473.
										(697.)	(601.)	(95.)	(11425.07)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CALCULATION OF OUTFLOW HYDROGRAPH FROM RESERVOIR

	ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	OTFLOW	1	0	0	0	0	1	0	0

ROUTING DATA

	GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
	0.0	0.000	0.00	1	1	0	0	0

	NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	-1555.	-1

STAGE	1554.50	1569.00	1570.00	1576.00	1578.00	1580.00	1581.00	1582.00	1583.00	1584.00
	1585.00	1586.00	1587.00	1588.00	1589.00	1590.00				
FLOW	0.00	55.00	98.00	194.00	109.00	2592.00	4695.00	7219.00	10044.00	13241.00
	16770.00	20590.00	24698.00	29084.00	33740.00	38777.00				
SURFACE AREA=	1.	39.	115.	143.	185.	842.				

CAPACITY=	0.	151.	882.	1654.	2309.	4627.
ELEVATION=	1555.	1560.	1570.	1576.	1580.	1590.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CARFA	EXPL
1578.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1587.0	2.7	1.5	720.

PEAK OUTFLOW IS 103. AT TIME 40.00 HOURS

PEAK OUTFLOW IS 3420. AT TIME 46.50 HOURS

PEAK OUTFLOW IS 5300. AT TIME 45.50 HOURS

PEAK OUTFLOW IS 7160. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 10422. AT TIME 44.50 HOURS

PEAK OUTFLOW IS 13576. AT TIME 44.25 HOURS

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS RESERVOIR - 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPPP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0450	0.0450	1535.0	1600.0	1600.	0.00060

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1600.00 550.00 1560.00 1060.00 1539.00 1070.00 1535.00 1080.00 1535.00
1090.00 1539.00 1250.00 1560.00 1500.00 1600.00

STORAGE	3.66	9.33	18.60	32.82	66.55	118.00	181.16	258.04	347.40	445.61
	552.41	667.81	791.80	924.39	1065.58	1215.37	1373.75	1540.73	1716.31	1901.48
OUTFLOW	3.76	98.97	586.68	2131.67	5213.07	10391.82	18057.20	28594.54	43070.29	61124.74
	82522.22	107427.13	135950.88	168247.16	204401.56	244739.22	289225.50	336062.38	381393.88	449366.31

```
     STAGE     1535.00    1538.42    1541.84    1545.26    1548.68    1552.10    1555.53    1558.95    1562.37    1565.79
               1569.21    1572.63    1576.05    1579.47    1582.89    1586.31    1589.73    1593.16    1596.58    1600.00

      FLOW        0.00      98.93     586.60    2101.67    5213.07   10391.82   18057.20   28594.54   43070.29   61124.74
              82532.20  107427.23  135550.88  168247.16  204461.56  244739.22  289225.00  338962.38  391393.88  449360.31
   MAXIMUM STAGE IS     1538.5

   MAXIMUM STAGE IS     1546.7

   MAXIMUM STAGE IS     1546.7

   MAXIMUM STAGE IS     1549.9

   MAXIMUM STAGE IS     1552.1

   MAXIMUM STAGE IS     1553.5


              **********          **********          **********          **********          **********

                                                  HYDROGRAPH ROUTING

                              CHANNEL ROUTING -MOD PULS REACH 1-2
                                           ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                                               2        1        0        0        0        0        1        0        0
                                                                   ROUTING DATA
                                  QLOSS    CLOSS      AVG     IRES    ISAME     IOPT     IPMP              LSTR
                                    0.0    0.000     0.00        1        1        0        0                 0

                                           NSTPS    NSTOL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                                               1        0        0    0.000    0.000    0.000      0.         0


   NORMAL DEPTH CHANNEL ROUTING
   ----------------------------

           QN(1)    QN(2)    QN(3)    ELNVT    ELMAX    RLNTH      SEL
          0.0450   0.0450   0.0450   1495.0   1580.0    3600.  0.01100


         CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
            0.00 1585.00  305.00 1560.00  722.50 1500.00  745.00 1495.00  760.00 1495.00
          777.50 1500.00 1290.00 1560.00 1300.00 1580.00

    STORAGE       0.00      12.16      41.47      94.01     169.84     268.96     391.37     537.08     706.09     891.39
               1113.99    1352.95    1615.04    1900.51    2209.28    2542.42    2907.27    3305.21    3736.22    4201.31

    OUTFLOW       0.00    1151.63    6185.43   17079.25   35667.80   63594.73  102360.63  153365.16  217930.41  297315.94
             392729.50  505334.19  636255.13  786584.98  957312.13 1142195.50 1344594.00 1575489.75 1835714.25 2126291.50

      STAGE    1495.00    1499.47    1503.95    1508.42    1512.89    1517.37    1521.84    1526.32    1530.79    1535.26
               1539.74    1544.21    1548.68    1553.16    1557.63    1562.10    1566.58    1571.05    1575.53    1580.00
```

FLOW	0.00	1151.63	6185.43	17079.25	35667.80	63594.73	102360.63	153365.16	217930.41	297315.94
	392729.50	505334.19	636255.13	780584.00	957382.13	1142095.50	1344594.00	1575489.75	1835714.25	2126391.50

MAXIMUM STAGE IS 1495.4

MAXIMUM STAGE IS 1501.5

MAXIMUM STAGE IS 1503.1

MAXIMUM STAGE IS 1504.3

MAXIMUM STAGE IS 1505.7

MAXIMUM STAGE IS 1507.0

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 2-3

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
3.9	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0400	0.0450	1445.0	1500.0	3600.	0.01290

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1500.00 200.00 1480.00 400.50 1450.00 418.00 1445.00 438.00 1445.00
455.50 1450.00 600.00 1480.00 800.00 1500.00

STORAGE	0.00	7.01	19.55	42.43	77.88	125.91	186.53	259.72	345.49	443.84
	554.77	678.27	814.36	961.84	1119.02	1285.89	1462.46	1648.73	1844.68	2050.34
OUTFLOW	0.00	632.77	2606.88	6939.01	14380.50	25749.07	41764.11	63086.57	90335.70	124091.34
	164935.16	213384.84	269967.25	337807.81	414946.56	501313.69	597132.13	702643.13	818101.75	943765.88
STAGE	1445.00	1447.00	1450.79	1453.68	1456.58	1459.47	1462.37	1465.26	1468.16	1471.05
	1473.95	1476.84	1479.73	1482.63	1485.52	1488.42	1491.31	1494.21	1497.10	1500.00
FLOW	0.00	632.77	2606.88	6939.01	14380.50	25749.07	41764.11	63086.57	90335.70	124091.34
	164935.16	213384.84	269967.25	337807.81	414946.56	501313.69	597132.13	702643.13	818101.75	943765.88

MAXIMUM STAGE IS 1445.0

MAXIMUM STAGE IS 1451.8

MAXIMUM STAGE IS 1452.6

MAXIMUM STAGE IS 1453.7

MAXIMUM STAGE IS 1454.0

MAXIMUM STAGE IS 1454.3

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 3-4

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	3	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	3.000	0.000	0.000	0.	0

FORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVT	ELMAX	RLNTH	SEL
0.0450	0.0400	0.0450	1426.0	1480.0	1100.	0.01100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1480.00 450.00 1440.00 725.00 1431.00 742.50 1426.00 762.50 1426.00
760.50 1431.00 1010.00 1440.00 1300.00 1480.00

STORAGE	0.00	2.15	6.02	10.44	42.31	77.60	115.96	166.09	215.99	265.67
	327.12	388.34	453.34	522.11	594.65	670.97	751.06	834.93	922.56	1013.97
OUTFLOW	0.00	543.84	2235.41	7096.47	17994.19	37541.90	69546.19	118925.36	181624.59	261754.97
	291533.75	371196.56	461826.63	561318.88	672379.00	794517.38	928049.13	1073088.50	1230552.25	1401154.00
STAGE	1426.00	1428.84	1431.68	1434.53	1437.37	1440.21	1443.05	1445.89	1448.74	1451.58
	1454.42	1457.26	1460.10	1462.95	1465.79	1468.63	1471.47	1474.31	1477.16	1480.00
ELDT	0.0	543.84	2235.41	7096.47	17994.19	37541.90	69546.19	118925.36	181624.59	261754.97
	291533.75	371196.56	461826.63	561318.88	672379.00	794517.38	928049.13	1073088.50	1230552.25	1401154.00

MAXIMUM STAGE IS 1427.5

MAXIMUM STAGE IS 1442.4

MAXIMUM STAGE IS 1434.5

MAXIMUM STAGE IS 1434.5

MAXIMUM STAGE IS 1435.9

MAXIMUM STAGE IS 1436.2

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 4-5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPPT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QR(1)	QR(2)	QR(3)	ELNVT	ELMAX	RLNTH	SEL
0.0450	0.0450	0.0450	1390.0	1450.0	2600.	0.01400

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1450.00 610.00 1420.00 872.50 1395.00 890.00 1390.00 910.00 1390.00
927.50 1395.00 1790.00 1420.00 2350.00 1450.00

STORAGE	0.00	5.86	17.65	50.60	108.19	190.42	297.29	428.79	584.94	765.73
	971.20	1201.62	1457.04	1737.46	2042.87	2373.28	2728.69	3109.09	3514.49	3944.88
OUTFLOW	0.00	748.85	3277.06	10214.29	24566.96	48847.48	85245.94	135757.44	202235.41	286443.81
	390618.44	515424.66	663988.00	837017.88	1035859.25	1261867.75	1516389.75	1800754.50	2116272.00	2464231.00
STAGE	1390.30	1393.16	1396.32	1399.47	1402.63	1405.79	1408.95	1412.10	1415.26	1418.42
	1421.58	1424.73	1427.89	1431.05	1434.21	1437.37	1440.52	1443.68	1446.84	1450.00
FLOW	0.00	748.85	3277.06	10214.29	24566.96	48847.48	85245.94	135757.44	202235.41	286443.81
	390618.44	515424.66	663988.00	837017.88	1035859.25	1261867.75	1516389.75	1800754.50	2116272.00	2464231.00

MAXIMUM STAGE IS 1434.4

MAXIMUM STAGE IS 1436.4

MAXIMUM STAGE IS 1437.2

MAXIMUM STAGE IS 1438.0

MAXIMUM STAGE IS 1438.2

MAXIMUM STAGE IS 1400.2

********** *********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.20	RATIO 2 0.40	RATIO 3 0.50	RATIO 4 0.60	RATIO 5 0.80	RATIO 6 1.00
HYDROGRAPH AT	INFLOW	8.00	1	2943.	5885.	7357.	8828.	11771.	14714.
		(20.72)	(	83.33)(	166.66)(	208.32)(	249.99)(	333.32)(	416.65)(
ROUTED TO	OUTFLOW	8.00	1	103.	3420.	5300.	7068.	10422.	13576.
		(20.72)	(	2.93)(	96.85)(	150.08)(	200.13)(	295.12)(	384.42)(
ROUTED TO	1	8.00	1	103.	3418.	5284.	7052.	10392.	13546.
		(20.72)	(	2.92)(	96.79)(	149.62)(	199.70)(	294.26)(	383.59)(
ROUTED TO	2	8.00	1	103.	3413.	5267.	7055.	10400.	13550.
		(20.72)	(	2.92)(	96.63)(	149.72)(	199.78)(	294.51)(	383.69)(
ROUTED TO	3	8.00	1	103.	3413.	5284.	7057.	10401.	13553.
		(20.72)	(	2.92)(	96.63)(	149.63)(	199.82)(	294.53)(	383.78)(
ROUTED TO	4	8.00	1	103.	3412.	5280.	7051.	10402.	13555.
		(20.72)	(	2.92)(	96.62)(	149.51)(	199.65)(	294.55)(	383.84)(
ROUTED TO	5	8.00	1	103.	3414.	5274.	7041.	10394.	13545.
		(20.72)	(	2.91)(	96.67)(	149.33)(	199.37)(	294.33)(	383.55)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1554.50	1578.00	1587.00
STORAGE	0.	1960.	3829.
OUTFLOW	0.	109.	24696.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1575.32	0.00	1558.	103.	0.00	48.00	0.00
0.40	1580.39	0.00	2892.	3420.	0.00	46.50	0.00
0.50	1581.24	0.00	3545.	5300.	0.00	45.50	0.00
0.60	1581.94	0.00	3985.	7068.	0.00	45.00	0.00
0.80	1583.12	0.00	2929.	10422.	0.00	44.50	0.00
1.00	1584.19	0.00	3142.	13576.	0.00	44.25	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1538.5	48.00
0.40	3418.	1546.7	46.50
0.50	5284.	1548.7	45.75
0.60	7052.	1549.9	45.25
0.80	10392.	1552.1	44.75
1.00	13546.	1553.5	44.25

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1495.4	48.00
0.40	3413.	1501.5	46.50
0.50	5287.	1503.1	45.75
0.60	7055.	1504.3	45.25
0.80	10400.	1505.7	44.75
1.00	13550.	1507.0	44.50

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1445.5	48.00
0.40	3413.	1451.3	46.75
0.50	5284.	1452.6	45.75
0.60	7057.	1453.7	45.25
0.80	10401.	1455.0	44.75
1.00	13553.	1456.3	44.50

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1426.5	48.00
0.40	3412.	1432.4	46.75
0.50	5280.	1433.5	45.75
0.60	7051.	1434.5	45.25
0.80	10402.	1435.4	44.75
1.00	13555.	1436.2	44.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	103.	1396.4	48.00
0.40	3414.	1396.4	46.75
0.50	5274.	1397.2	46.00

0.60	7041.	1398.0	45.25
0.80	10394.	1399.5	44.75
1.00	13545.	1400.2	44.50

PRP DATE 3/16/80 ERDMAN, ANTHONY, ASSOCIATES SHEET 1 OF 12

CKD K.R. DATE 3/16/81 SUBJECT DAM 593 HYDROLOGY SUB-SHEET NO. 1

OWNER PROJECT NAME HEC-1DB DAM INSPECTION : 80166-00.08

DAM 593 ELM CREEK DAM REFF. QUAD. RANDOLH, NY & NEW ALBION, NY.

DRAINAGE AREA

DISTANCE L & Lca MEAS. WITH MAP MEASURING WHEEL (1" = 2000')

COMPUTATIONS FOR 'L' DISTANCE

RUN		MEAS DIST	AVG. DIST	COEF	L DISTANCE
A	1	10.9"			
	2	10.8"			
		21.7"	÷ 2 = 10.85	x 2000 =	21700 *
B	1	9.6"			
	2	9.6"			
		19.2	÷ 2 = 9.6"	x 2000' =	19200 FT
C	1	10.7			
	2	10.6			
		21.3	÷ 2 = 10.65	x 2000' =	21300 FT.

* L = 25940 FT (USED RUN A)

COMPUTATIONS FOR Lca DISTANCE

	MEAS. DIST	AVG. DIST	COEF.	Lca DISTANCE
1	4.5"			
2	4.6"			
	9.1	÷ 2 = 4.55"	x 2000' =	9100 FT

Lca = 9100 FT.

$$T_p = C_T (L L_{ca})^{0.3} \quad , \quad C_T = 2.00$$

$$C_p = 0.63$$

$$T_r = \frac{T_p}{5.5}$$

$$T_{PR} = T_p + 0.25 (T_R - T_r)$$

$L = 25940$ ft $= \frac{25940}{5280}$ MILES $= 4.91$ MILES

$L_{ca} = 9100$ ft $= \frac{9100}{5280}$ MILES $= 1.72$ MILES

$$T_p = 2 (4.91 \times 1.72)^{0.3} = 3.79 \text{ hr.}$$

$$T_r = \frac{3.79}{5.5} = 0.69 \text{ hr.} \implies T_R = 1.0 \text{ hr}$$

$$T_{PR} = 3.79 + 0.25 (1 - 0.69) = 3.87 \text{ hr}$$

B.K. DATE 3/27/81 ERDMAN, ANTHONY, ASSOCIATES
KRA DATE 4/1/81 SUBJECT DAM 593 - HYDRAULICS SUB-SHEET NO. 1
OWNER PROJECT NAME DAM INSPECTION 80166-00.08

DAM 593 HYDRAULICS

SERVICE SPILLWAY

30" ϕ RCP ✓ W / 5'x 2'-6" RISER ✓

From Design Report: $Q_s = 105$ cfs @ ELEV. 1576'

$Q_s = 0$ @ ELEV. 1554.5'

$Q_s = C_o A_o \sqrt{2g H_o}$ ignor the orifice in the riser

$A_o = [(30/12)^2/4]\pi = 4.91$ ft² ✓

Determine C_o from $Q_s = 105$ cfs and $H_o = (1576 - 1554.5) = 21.5$ ft

$$C_o = \frac{Q_s}{A_o\sqrt{2g H_o}} = \frac{105}{4.91\sqrt{2\times 32.2\times 21.5}} = 0.57$$ ✓

TABLE 1

SERVICE SPILLWAY Q_s – ELEV. RELATIONSHIP

ELEV.	H_o	Q_s
1554.5	0	0 ✓
1560	5.5	53 ✓
1570	15.5	88 ✓
1576	21.5	104 ✓
1578	23.5	109 ✓
1580	25.5	113 ✓
1581	26.5	116 ✓
1582	27.5	118 ✓
1583	28.5	120 ✓
1584	29.5	122 ✓
1585	30.5	124 ✓
1586	31.5	126 ✓
1587	32.5	128 ✓

For elevations higher than the crest of riser.:

$Q_s = 0.57 \times 4.91\sqrt{2\times 32.2\ H_o}$

$Q_s = 22.46\ H_o^{0.5}$ ✓

CONTINUATION OF TABLE 1

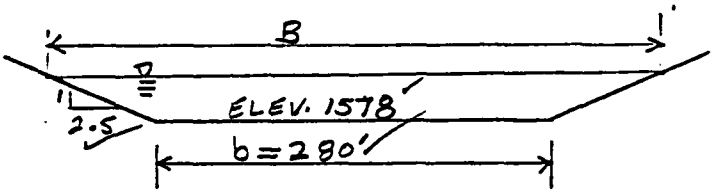
ELEV.	H_o	Q_s
1588	33.5	130 ✓
1589	34.5	132 ✓
1590	35.5	134 ✓
1591	36.5	136 ✓
1592	37.5	138 ✓

* ACTUAL EMERGENCY SPILLWAY CREST

** ACTUAL TOP OF DAM

EMERGENCY SPILLWAY

$$Q_c = \sqrt{\frac{g A^3}{B}}$$



EMERGENCY SPILLWAY SECTION

$S_o = 0.024$ ✓

FOR $y = 1'$

$B = (2 \times 2.5) + 280 = 285$ ft ✓

$A = \frac{1}{2}(280 + 285)(1) = 282.5$ ✓

$$Q_c = \sqrt{\frac{32.2\,(282.5)^3}{285}} = 1596 \text{ cfs}$$ ✓

$$K = \frac{1.49}{n} A R^{2/3} = \frac{1.49}{0.035}\, 282.5 \left[\frac{282.5}{280 + 2 \cdot (1 + 2.5^2)^{.5}}\right]^{2/3}$$

$K = 11945.24$

$$S_c = \left(\frac{1596}{11945.24}\right)^2 = 0.018$$

spillway slope > critical slope

$0.024 > 0.018$

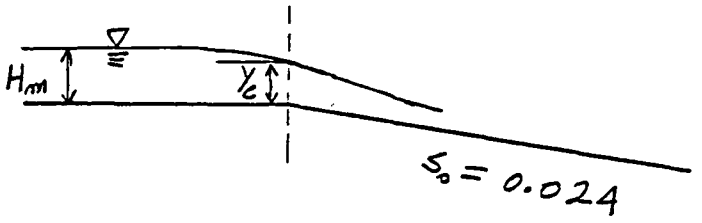
∴ Flow goes through critical depth for $y = 1'$ and also for $y > 1'$

use Table 8-7 from "King and Brater"

$Z = 2.5/1 = 2.5$ ✓

$b = 280'$ ✓

$Q_E = C_2 \, b \, H_m^{1.5}$



EMERGENCY SPILLWAY PROFILE

TABLE 2

EMERGENCY SPILLWAY, Q-ELEV. RELATIONSHIP

	H_m	$\frac{H_m Z}{b}$	C_2	Q_E	ELEV.
	0	0	3.09	0	1578
	1	0.01	3.11	871 ✓	1579
	2	0.02	3.13	2479 ✓	1580
	3	0.03	3.15	4583 ✓	1581
	4	0.04	3.17	7101 ✓	1582
	5	0.04	3.17	9924 ✓	1583
	6	0.05	3.19	13127 ✓	1584
	7	0.06	3.21	16646 ✓	1585
	8	0.07	3.23	20464 ✓	1586
**	9	0.08	3.25	24570 ✓	1587
	10	0.09	3.27	28954 ✓	1588
	11	0.10	3.29	33608 ✓	1589
	12	0.11	3.32	38643 ✓	1590

← ACTUAL TOP OF DAM

ELM CREEK DAM

$A = RAREA RESERVOIR SURFACE AREA IN ACRES
$E RELEV RESERVOIR ELEVATIONS IN FEET
REFF. U.S. DEPT. OF A.S.C.A. AS BUILT PLAN DWG. NY-849-P
SCALE = 1" = 400' (1/2 REDUCTION = 1" = 800')

Eq. $in^2 \times \frac{800^2 ft^2}{in^2} \times \frac{1 AC.}{43560 ft^2} = AC.$ ✓

ELEV. 1554.5 = 18 Ac. GIVEN IN DESIGN REPORT DWG. NY-849-R

1560 $2.60 in^2 \times \frac{800^2 ft^2}{in^2} \times \frac{1 AC.}{43560 ft^2} = 38.19 AC.$ ✓

1570 = $7.82 in^2 \times \frac{800^2 ft^2}{in^2} \times \frac{1 AC}{43560 ft^2}$ 114.88 Ac. ✓

1576.2/ = 143 Ac. GIVEN IN DESIGN REPORT DWG. NY-849-R ✓

1580 $12.61 in^2 \times \frac{800^2 ft^2}{in^2} \times \frac{1 AC}{43560 ft^2} = 185.24 AC.$ ✓

1590 = $19.18 in^2 \times \frac{800^2 ft^2}{in^2} \times \frac{1 AC.}{43560 ft^2} = 281.8 AC.$ ✓

Refer to subsheet B. The SCS storage values were used instead of surface areas to compute volume.

TABLE 3 ($Q_s + Q_E$) TOTAL SPILLWAYS DISCHARGE		
ELEV.	$Q_s + Q_E$	RESERVOIR SURFACE AREA
1554.5	0 ✓	18 AC. ✓
1560	53 ✓	38.19 AC. ✓
1570	88 ✓	114.88 AC. ✓
1576	104 ✓	143. AC. ✓
* 1578	109	
1580	2592 ✓	185.24 AC. ✓
1581	4699 ✓	
1582	7219 ✓	
1583	10,044 ✓	
1584	13,249 ✓	
1585	16,770 ✓	
1586	20,590 ✓	
** 1587	24,698 ✓	
1588	29,084 ✓	
1589	33,740 ✓	
1590	38,777 ✓	281.8 AC. ✓

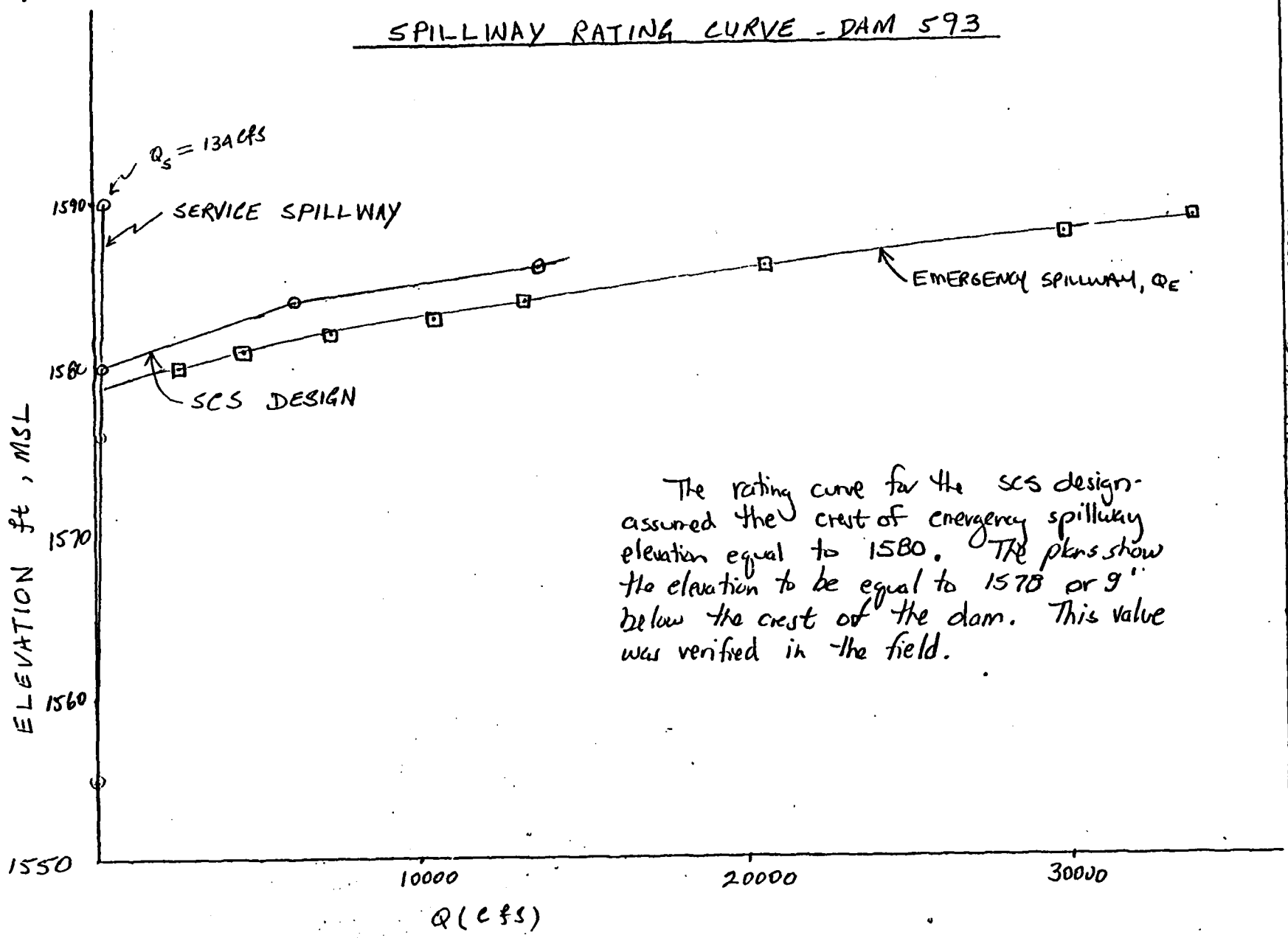
* ACTUAL EMERGENCY SPILLWAY CREST
** ACTUAL TOP OF DAM

BY K.K. DATE 2/20/91 ERDMAN, ANTHONY, ASSOCIATES SHEET 6 OF 15

TO DATE SUBJECT DAM 593 - HYDROLOGY SUB-SHEET NO. 6

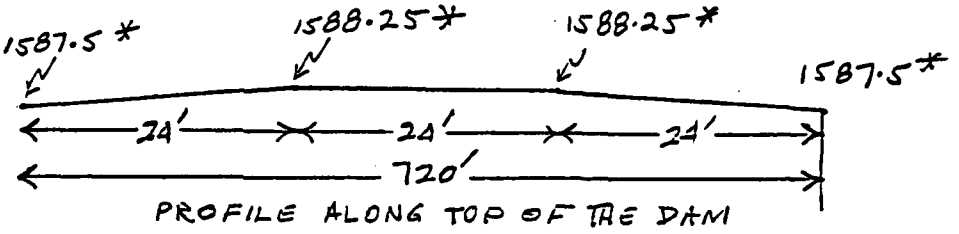
OWNER PROJECT NAME DAM INSPECTION 90166 - 00.00

SPILLWAY RATING CURVE - DAM 593



The rating curve for the SCS design assumed the crest of emergency spillway elevation equal to 1580. The plans show the elevation to be equal to 1578 or 9' below the crest of the dam. This value was verified in the field.

VALUES ON $D CARD OF HEC-1 PROGRAM



PROFILE ALONG TOP OF THE DAM

FIELD	VARIABLE	VALUE
0	ID	$D
1	TOPEL	1587. ✓
2	COQD	2.7 ✓
3	EXPD	1.5 ✓
4	DAMWID	720' ✓

$Q = cLh^E$

WEIR EQUATION FOR THE FLOW OVER THE TOP OF DAM

$c = 2.7$ ✓

$L = 720'$ ✓

$E = 1.5$ ✓

* settled elevation of top of dam = 1587.0

Emergency Spillway Velocities

Flood	Q_T	Elev.	$Q_{E.S.}$	A	V	Comments
PMF	13,576 ✓	1584.09 ✓	13,444	1329	10.1	>8 ft/sec ∴ erodible
½ PMF	5,300 ✓	1581.24 ✓	5187	736	7.0	<8 ft/sec ∴ not erodible

b = 280'

PMF

$$1\begin{bmatrix}\text{Elev.}\\ 1584.0\\ 1584.09\\ 1585\end{bmatrix}.09 \quad y\begin{bmatrix}Q_{ES}\\ 13,127'\\ Q\\ 16,646'\end{bmatrix}3519$$

$$\frac{0.09}{1} = \frac{y}{3519} \qquad y = 317 \text{ cfs} \qquad Q = \underline{13,444 \text{ cfs}}$$

Since $y_n/b < 0.02$

$$* y_n = 0.789\left(\frac{Q\,n}{b\,S^{1/2}}\right)^{0.6} = 0.789\left(\frac{13,444(0.06)}{280(0.024)^{1/2}}\right)^{0.6} = \underline{4.56 \text{ ft}}$$

$$A = \tfrac{1}{2}\left(280 + [4.56(2.5)(2) + 280]\right) \times 4.56 = \underline{1329 \text{ ft}^2}$$

$$V = \frac{Q}{A} = \frac{13,444 \text{ cfs}}{1329 \text{ ft}^2} = \underline{10.1 \text{ ft/sec}}$$

½ PMF

$$\begin{bmatrix}\text{Elev.}\\ 1581.0\\ 1581.24\\ 1582.0\end{bmatrix}.24 \quad y\begin{bmatrix}Q_e\\ 4583\\ Q\\ 7101'\end{bmatrix}2518$$

$$\frac{0.24}{1} = \frac{y}{2518} \qquad y = 604 \text{ cfs} \qquad \underline{Q = 5187 \text{ cfs}}$$

KRA 4/13/81
B.R. 4/13/81 ELM CREEK DAM

DAM DATA FROM AS BUILT PLAN

DAM TOP 1587.9
DAM INV. 1536.0
h = 51.9

REVISED CROSS SECTIONS: 1600/0, 1560/550, ~~1541~~ 1539/1060, 1535/1070, 1535/1080, ~~1541~~ 1539/1090, 1560/1250, 1600/1500

REACH 1 LENGTH = 1600'

CROSS SECT. = 1600/0, ~~1550/200~~, 1560/550, 1550/650, 1540/1010, 1535/1070, 1535/1080, 1540/1175, 1550/1200, 1560/1250, ~~1580/1300~~, 1600/1500

SLOPE: DAM INV − REACH 1 INV = h ÷ L = SLOPE
1536.0 − 1535 = 1' ÷ 1600' = 0.0006

REACH 2 LENGTH = 3600'

Revised: 1580/0, 1560/300, 1500/722.5, 1495/740, 1495/760, 1500/777.5, 1560/1200, 1580/1300

CROSS SECT. 1580/0, 1560/300, 1540/390, 1520/450, 1500/700, 1495/745, 1495/755, 1500/800, 1520/950, 1540/1100, 1560/1200, 1580/1300

SLOPE: REACH 1 INV. − REACH 2 INV. = h ÷ L = SLOPE
1535 − 1495 = 40' ÷ 3600 = 0.011

REACH 3 LENGTH = 3600'

Revised: 1500/0, 1480/200, 1450/400.5, 1445/418, 1445/438, 1450/455.5, 1480/800, 1500/850

CROSS SECT 1500/0, 1480/230, 1460/330, 1445/423, 1445/433, 1460/475, 1480/800, 1500/850

SLOPE: REACH 2 INV − REACH 3 INV. = h ÷ L = SLOPE
1495 − 1445 = 50 ÷ 3600' = 0.0139

REACH 4 LENGTH = 1800'

Revised: 1480/0, 1440/450, 1431/725, 1426/742.5, 1426/762.5, 1431/780, 1440/1010, 1480/1300

CROSS SECT. 1480/0, ~~1460/100~~, ~~1440/450~~, 1426/695, 1426/705, 1430/710, 1430/795, 1426/800, 1426/810, ~~1440/1010~~, ~~1460/1150~~, 1480/1300

SLOPE: REACH 3 INV − REACH 4 INV = h ÷ L = SLOPE
1445 − 1426 = 19 ÷ 1800' = 0.011

REACH 5 LENGTH = 2600'

Revised: 1450/0, 1420/610, 1395/872.5, 1390/890, 1390/910, 1395/927.5, 1420/1700, 1450/2350

CROSS SECT. 1450/0, ~~1440/250~~, 1420/610, 1400/700, 1390/895, 1390/905, 1400/1010, 1420/1700, 1440/1800, 1450/2350

SLOPE: REACH 4 INV. − REACH 5 INV. = h ÷ L = SLOPE
1426 − 1390 = 36' ÷ 2600' = 0.014

Since $y_n/b < 0.02$

$$*y_n = 0.789\left(\frac{Q\,n}{b\,S_o^{1/2}}\right)^{0.6} = 0.789\left(\frac{5187(0.06)}{280'(0.024)^{1/2}}\right)^{0.6} = \underline{2.57\ ft}\ \checkmark$$

$$A = \frac{1}{2}\left(280 + [2.57(2.5)(2) + 280]\right) \times 2.57 = \underline{736\ ft^2}\ \checkmark$$

$$V = \frac{Q}{A} = \frac{5187\ cfs}{736\ ft^2} = \underline{7.0\ ft/sec}$$

* Ref: Table 103E "Open Channel Hydraulics", C. Posey.

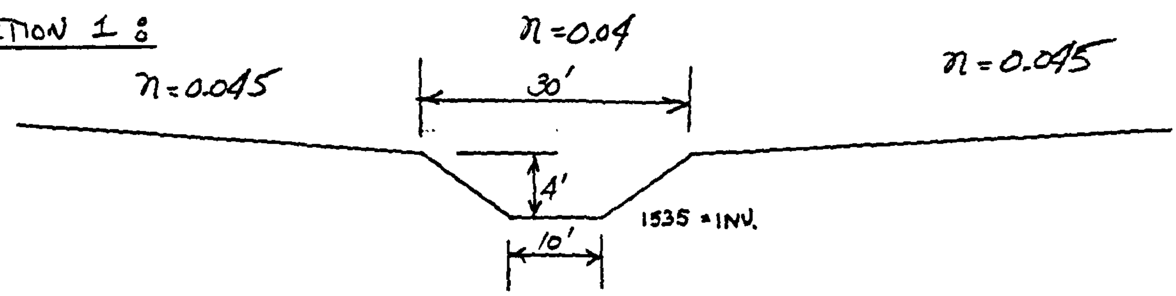
BY ______ DATE ______ ERDMAN, ANTHONY, ASSOCIATES SHEET ______ OF ______

CKD B. R. DATE 4/13/81 SUBJECT DAM 593 - CHANNEL SECTIONS SUB-SHEET NO. 1

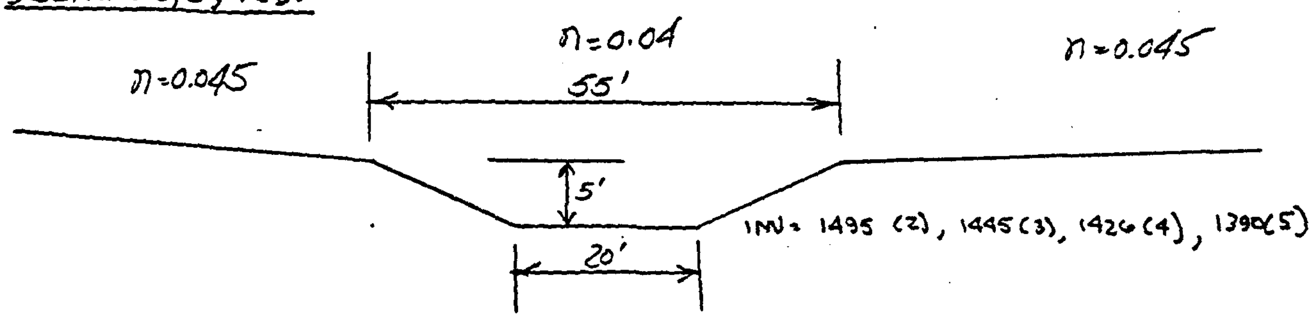
OWNER PROJECT NAME DAM INSPECTIONS (E0166-00.08)

DAM 593 - CHANNEL SECTIONS

SECTION 1:



SECTIONS 2, 3, 4 & 5:



APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS

80/11/14. PAGE 128

FORM 4474 ITEM	NOMENCLATURE	DATA
1	ID	NY00593
2	DIVISION	NAD
3	STATE	33
4	COUNTY	009 (CATTARAUGUS)
5	CONGR. DIST.	39
6	2ND STATE	
7	2ND COUNTY	
8	2ND CONGR	
9	OFF. DAM NAME	ELM CREEK DAM
10	LATITUDE	42-13.4
11	LONGITUDE	078-56.6
12	REPORT DATE	80/09/14.
13	POPULAR NAME	NONE
14	IMPOUND. NAME	UNKNOWN
15	REGION	05
16	BASIN.	01
17	RIVER/STREAM	ELM CREEK
18	D/S CITY-TOWN	EAST RANDOLPH
19	DISTANCE	004
20	POPULATION	00000379
21	TYPE OF DAM	RE
22	YEAR COMPLETED	1964
23	PURPOSES	C
24	STR. HEIGHT	0051 ✓
25	HYD. HEIGHT	0044 ~~42~~
26	MAX CAPACITY	00002321 ~~3700~~
27	NORMAL CAP.	00000095 ✓
27A	CORPS DIST.	ORP
27B	OWNER CODE	N
27C	FED. REGULATED	N
27D	PVT. ON FED.	N
27E	SCS AID	Y
27F	VERIFY DATE	80/09/25.

FORM 4474 ITEM	NOMENCLATURE	DATA
28	(SEE BELOW)	
29	D/S HAZARD	~~1~~ 1
30	CREST LENGTH	~~00800~~ 720+325 = 1045
31	SPILLWAY TYPE	11
32	SPILLWAY WIDTH	0280+45=325
33	MAX DISCHARGE	~~0006030~~ 24698
34	VOLUME	~~00252000~~ 87,677
35	POWER INSALLED	
36	POWER PROPOSED	
37	NO. OF LOCKS	0
38-45	LOCK LEN/WID	
46	OWNER NAME	MR. ~~GERHARDT~~ HORTON
47	ENGINEERING	SCS
48	CONSTRUCTION	
49	REG. DESIGN	DEC
50	REG. CONST	DEC
51	REG. OPER.	(DEC) SCS
52	REG. MAINT.	DEC
53	INSPECTOR	
54	INSP. DATE	
55	INSP. AUTH.	ENCON LAW SECT15-0507
56	(SEE BELOW)	
57	INSP. INIT.	03 APR 81
58	UNSAFE	
59	URGENCY	
60	INSP. COMPL.	15 MAY 81
61	RPT. APPR.	
62	GOV. NOTIF.	
63	INSPECTOR	DC
64	GOV. RPT.	
65	DEFICIENCY	OD

28 REMARK 1-10-14A-3266

56 REMARK ~~30-248 DROP INLET, 32A) AUXILARY EMERGENCY SPILLWAY; PRINCIPAL SPILLWAY IS A 30" CONDUIT WITH 5'x2.5' CONE RISER.~~

33 - TOTAL OF EMERGENCY AND PRINCIPAL SPILLWAYS.

INSP. REMARK

E-1